

# Optimizing Recovery from Hyperthyroidism

*“The truth is rarely pure and never simple.” – Oscar Wilde*

Our patients are often not only debilitated from hyperthyroidism, but may have concurrent non-thyroidal illness(es). Some hyperthyroid cats simply have “too much other disease” to warrant I-131 therapy. Even though treating with I-131 won’t hurt (does not cause radiation illness), and might help (does cure the thyroid disease), resolving the thyroid disease alone may not be enough, or in time, to assure recovery, and thereby justify the cost and owners’ hopes.

On the other hand, **many hyperthyroid cats, with less co-morbidity, do well after I-131, as long as they receive ongoing medical management, as early as possible, as long as they need.**

*The time before I-131 treatment until the thyroid disease resolves can be the most challenging for hyperthyroid cats.*

## The Challenges

Methimazole must be discontinued a week prior to radioiodine therapy, in order to maximize uptake of the isotope into the hyperactive thyroid tissue. Thus, the thyroid hormones are temporarily uncontrolled, and cure isn’t instant. Signs of thyroid disease must be managed until it’s completely resolved.

Hyperthyroid cats have high metabolisms. They burn calories faster than they can eat them, and resort to catabolizing their own muscle, even sooner than fat. They also have extended changes in glucose and insulin metabolism, making it difficult to rebuild muscle for a while after cure.

In addition to generalized weakness and muscle loss, hyperthyroidism can cause potassium wasting, dehydration, vomiting, diarrhea, poor cobalamin absorption, and hormonal mental distress. Signs of cardiovascular disease, such as hypertension, tachycardia, arrhythmias, and even pleural effusion, may be influenced or entirely due to thyrotoxicity.

Co-morbidities, such as CKD, primary GI disease (IBD, LSA), infections, periodontal disease, primary HCM and/or non-thyroidal hypertension, pancreatitis, or diabetes mellitus, often complicate matters. Debilitated cats have weakened resistance to bacterial infections, and viral or parasitic residents may ‘flare’; e.g., urinary tract infections and recrudescence of upper respiratory residents are not uncommon.

Addressing each illness, and treating those that interfere with recovery, will give our hyperthyroid patients their best chance.

## Optimizing Recovery

Once your patient’s candidacy for I-131 therapy is established, we encourage plans to:

- stabilize the cat as much as possible **before travel** to our facility,
- manage their signs of both hyperthyroidism and co-morbid-ities **during hospitalization** for I-131,
- and for continued guidance by their primary care veteri-narian **after they return home** to their owner’s care.

## Thyroidal or Non-Thyroidal Illness (NTI?)

It may be difficult to differentiate which signs are most likely due to hyperthyroidism, and which are related to non-thyroidal illness (NTI).

**Some signs have a high statistical correlation to thyroid disease.** For example, tachycardia is most likely related to thyroxine elevation, so it’s pretty safe to assume that the heart rate will decrease when the thyroid hormone normalizes. Likewise, thyroid nodules (adenomas, adenocarcinomas) are almost invariably productive, and we know that the thyroid hormone levels will return to normal after the hyperactive tissue is destroyed.

**Other signs of illness have no statistical correlation to thyroid disease, hence, there’s an equally good chance they are caused by something else.** Heart murmurs, for instance, may or may not disappear after resolution of the thyroid disease. The same is true for hypertension, which may not only be caused by concurrent disease, such as CKD, but sometimes develops after the thyroid disease is gone.

Gastroenteritis in hyperthyroid cats often has a primary etiology, such as IBD or LSA, and is simply aggravated by thyroid disease. An exception might be the cat with exceedingly high hormones, which may indeed cause v/d or even anorexia. If GI signs continue after the T4 normalizes, further diagnostics for a non-thyroidal etiology should be pursued.

*Regardless of the underlying cause of the signs, they must be treated in order to improve the patient’s recovery.*

## When Do We Treat: Before or After T4 Normalization?

Veterinarians are often reluctant to assign treatments until known to be absolutely necessary. It’s tough to pill cats, some medications have side effects, and their effects must be monitored, typically by laboratory testing, which adds expense and stress due to more veterinary visits.

Therefore, waiting to see which signs disappear once the T4 normalizes is tempting, and usually ok in cats with relatively mild symptoms.

However, frail patients require more conscientious management to prepare them for travel and hospitalization for I-131, and, ultimately, to recover.

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Which issues require intervention depend upon the impact of the disease, thyroidal or concurrent illness, as well as the cat's general condition. For example, untreated hypertension could lead to detached retinas and/or increase the risk of a cardiovascular incident when an animal is stressed. Therefore, systolic blood pressures should be checked, and hypertension controlled, before travel and hospitalization. Mild ALT elevations, on the other hand, can usually be ignored until the first recheck one month after I-131. Obviously, cats with CHF failure require immediate stabilization, whereas diagnostics for mild vomiting or soft stools may be postponed until the thyroid disease is resolved, and excluded from the etiology differential.

## No Overnight Cure: How Long Before the Hyperthyroidism is Resolved?

I-131 doesn't eliminate the thyroid tumor(s) overnight. This takes days to weeks, but may occasionally take months. The thyroid hormones must decrease before noticeable improvement in overall health is possible. Some cats require a second treatment with I-131 to destroy all remaining hyperactive tissue, and therefore have an extended recovery period.

## Is It A Good Idea to Begin Methimazole Before or Resume It After I-131?

If the cat has not been on methimazole, we usually do not recommend starting it if treatment with I-131 is soon. Unless significant (IRIS stage 3) renal failure is suspected, we do not advise methimazole trials, in the vast majority of cases. It is usually best to simply treat with I-131 and eliminate the thyroid disease straight away, thereby avoiding potential side effects of the methimazole and delaying cure, as well as reducing cost and inconvenience for the owner.

The majority of candidates for I-131 are relatively stable, with slightly to moderately high T4 levels and no overt heart failure. If they've been on methimazole, they typically go off it 1 week prior to I-131, and never resume it.

Uncommon exceptions might be cats with severe heart disease or emaciation. The concern is that they'll destabilize if off the methimazole. In these instances, we may discontinue the methimazole only a day or two before I-131 to enhance radioiodine uptake, and resume a day or two afterwards. By doing so we hope to protect the heart from undue thyrotoxicity and/or reduce cachexia while waiting for the thyroid disease to resolve. The methimazole would be discontinued about 3 weeks after I-131, or a week prior to the 1-month recheck.

## Other Considerations: Signs of Disease, Treatment Options

### Mental Stress:

Elevated thyroid hormone levels cause agitation and anxiety. At home these cats may haunt the halls with caterwauls, race around, and display aggression with the other animals in the household. They may be more clingy or irritable with their human companions, and don't travel well.

### Ramping It Down:

We do everything we can to create a stress-free environment at FHTC, starting with clean, sound-proofed exam rooms and hospital wards, with feline pheromone (Feliway®) infusers. There are no dogs, which frighten some kitties. We also offer as much food as they can eat, as extreme polyphagia makes some cats panicky.

We give agitated and anxiety-ridden cats alprazolam or gabapentin daily while hospitalized, including the morning of their car ride or flight home. Ideally, this medication could be prescribed by the primary care veterinarian and started before they travel to us.

And, (need I say?) we love cats; I believe they can tell.

### Cachexia:

Cats recovering from hyperthyroidism have typically been in a catabolic state with significant alterations in glucose metabolism. As carnivores, these patients need high amounts of meat-based proteins, found in canned and raw diets. Protein-restricted renal failure diets should be reserved for those cats in advanced (stage 3,4) renal failure with severe azotemia, not our usual candidates for I-131. If in earlier stages of renal insufficiency, without much proteinuria, an adequate amount (calories) of a normo-protein, low-phosphorus diet +/- phosphorus binders, may be best. We're careful to advise the owners to feed as much food as their cat can possibly eat, as often as possible.

### Cobalamin (B-12) Deficiency:

Dr. Kenneth Simpson's (BVM. PhD, DACVIM, Cornell University) research relating to cobalamin deficiency in cats reveals that 40-47% of hyperthyroid cats are vitamin B-12 (cobalamin) deficient, and that percentage increases dramatically (60-70%) in those that are debilitated and/or have gastrointestinal disease. Low serum cobalamin is most likely a result from decreased ileal absorption of dietary cobalamin, rather than dietary deficiency.

Cobalamin deficiency isn't clinically recognizable, but depletions are linked with chronic wasting or failure to thrive, malaise, and gastrointestinal signs such as diarrhea. Hyperthyroid cats improve more rapidly after I-131 if concurrently treated with cobalamin; they gain weight more rapidly, feel better and have less diarrhea.

Although it's ideal to measure serum cobalamin, especially in cats with chronic gastrointestinal disease, we're not measuring concentrations in cats treated at FHTC. We err on the safe side and give a bolus of 0.5 ml (500 µ) of 1000 µ/ml cyano-cobalamin SQ to the more debilitated patients. Cobalamin is inexpensive and harmless (any excess is readily disposed of by the body). You may prescribe cobalamin to be given weekly (at home) until cobalamin levels are within your lab's normal range or, if treating empirically, about 6 weeks. It may be continued bi-weekly thereafter in cats with continued GI signs or longer-lasting thyroid disease.

### Dehydration:

Hyperthyroid patients are predisposed to dehydration. They're typically older cats that often have some renal compromise. They may be unable to concentrate urine and conserve fluid as well, even if they're not yet in overt renal failure. The elevated thyroid hormone has a diuretic effect. And sick, stressed cats in the hospital don't always eat and drink enough.

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We routinely give subcutaneous fluids to dehydrated cats, and advise pDVMs to rehydrate their patients as needed, prior to hospitalization here. In CKD cats, it may be ideal to continue SQ fluids daily or every other day for 10 days after I-131.

Cats with CKD and those with HT4 are predisposed to hypertension. In either case, the SBP checked and corrected if high, prior to fluid administration. Caution should also be exercised when administering fluids and/or corticosteroids to cats with severe hyperthyroidism and known or presumed thyrotoxic cardiovascular disease, as they may be tipped into congestive heart failure.

### **Hypertension:**

If the systolic blood pressure is higher than 180 mm Hg, we start amlodipine (¼ of a 2.5 mg tablet orally Q 24 hours) to control the hypertension. Normal SBP in calm cats is 140-160 mm Hg. Target organ damage (TOD) range is over 180. If we check SBP at FHTC, we give an anxiolytic, and allow the cat to rest in a quiet room by itself, whenever possible, for a couple of hours before gently taking a SBP with a Doppler.

Uncontrolled hypertension in cats can cause retinal detachment, or strokes, and worsens cardiac function. Because hypertension may worsen in hyperthyroid cats when off methimazole and hospitalized for treatment with I-131, we're more proactive about controlling it, not only while in the hospital, but for those first weeks at home as the thyroid disease resolves. We also advise treating hypertension prior to travel, especially if the BP is very high, the cat is high-strung, and/or the travel is prolonged or involves a flight.

Once the T4 is determined to be normal, at the post I-131 rechecks, the pDVM may opt to discontinue the amlodipine for 3-5 days and recheck the BP to see if this medication is still needed. If the BP remains elevated after the thyroid disease is resolved, we assume other etiologies, such as CKD or heart disease, and the amlodipine (or benazepril) should be resumed and continued indefinitely.

### **Cardiovascular Disease:**

Tachycardia is expected in most hyperthyroid patients. If the HR ≤ 220, I don't intervene, unless a cardiologist advises otherwise.

However, if a new patient's heart rate is extremely high, e.g., 240-300 BPM, and remains so after an anxiolytic medication and rest in a quiet room, we may start a beta blocker, such as atenolol or propranolol, for heart rate control. I advise continuing the medication until the thyroid hormone decreases and the pDVM reevaluates at the post-I-131 recheck(s).

I also check the SBP in every cat with extremely high HR's (240-300) and add amlodipine if very high, as the β-blocker alone may not completely control the hypertension.

Cats with long-standing hyperthyroidism may have more heart disease. A cardiologist may perform (and properly interpret!) an echocardiogram in order to assess how much heart damage has occurred, prior to the referral to us. Occasionally there's just too much "burnt-out" cardiomyopathy to warrant going further. More often, a cardiologist will prescribe an informed course of therapy to reduce the risk of a cardiovascular event during this more difficult

time, and will already be on board in case heart failure occurs while we're attempting to treat and stabilize a fragile cat.

### **Dyspnea:**

Decompensation (congestive heart failure and/or thyroid storm) is more likely when they go off hormonal control via methimazole, and when they are stressed during travel, hospitalization, and/or are sick from other disease.

If your patient is not breathing well (not just hyperventilating from hormonal duress and stress) try to determine whether the dyspnea is associated with CHF or something else, and stabilize the cat regardless, prior to the appointment at FHTC.

- chest radiographs + SBP + assess for acute lameness or other indications of stroke (thromboembolism)
- B-type natriuretic peptide (Pro-BNP) test: The BNP hormone, produced by stressed heart muscle, is increased during CHF, so may be useful to help differentiate CHF-related dyspnea, from other non-cardiac conditions, such as an effusive chest mass or bronchitis.
- Stabilize (if CHF: O<sub>2</sub>, diuretics, +/- thoracocentesis, pimobendan, clopidogrel, (re)start methimazole, etc.)
- Consult with cardiologist/echo if CV

### **Hypokalemia:**

Causes of hypokalemia, such as muscle wasting, vomiting, and urinary loss are common in hyperthyroid cats. Many of these older cats have CKD, pre-diabetes or are on diuretics for CHF. Chronic hypokalemia in turn may cause hypokalemic nephropathy, leading to even more loss.

Potassium is essential for nerve impulse transmission; smooth, skeletal and cardiac muscle contraction; and maintenance of normal renal function. Potassium is also needed for carbohydrate utilization and protein synthesis.

Severe hypokalemia targets neuromuscular and cardiac cells primarily. Classic signs may include ventroflexion of the head and neck, stiff gait, plantigrade stance, and cardiac arrhythmia.

Cats with mild to moderate hypokalemia don't show clinical signs, so we depend upon laboratory evaluation to know when to begin supplementation. However, there are no universal reference ranges for potassium. Potassium levels are method dependent, and methods vary from lab to lab. So, we can't make a blanket statement that "K+'s below 4 mEq/L should be treated". It's best to establish that individual's normal based on prior lab work, and to refer to your own lab's reference range.

Keeping in mind that >90% of the K<sup>+</sup> is intracellular and IC levels have to be depleted before the loss is evident in serum, it's better to begin supplementation when the levels are even borderline-low for any cat, any lab.

For mild, chronic hypokalemia, we recommend oral potassium gluconate (Tumil K<sup>®</sup>, Renakare<sup>®</sup>) 2 mEq Q 12 hours.

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## INSIDE: Optimizing Recovery from Hyperthyroidism

### Hyperphosphatemia:

If any evidence of CKD exists, a low-phosphorus (but not necessarily protein-restricted) diet is indicated. Hyperphosphatemic cats should be on a phosphorus binder (aluminum hydroxide) as well.

### Urinary Tract Infections:

In older cats, most urinary tract infections involve the kidneys. Inadequately treated pyelonephritis causes the kidneys to degenerate more quickly. We advise treating UTI's, to lessen loss of already scanty nephron reserves. The ease of a Convenia® injection is appealing, but cephalosporins are less likely to be effective against cocci (often Enterococci) than rods (usually E. coli) and would best be reserved for more susceptible bacteria.

### Anorexia:

Not all hyperthyroid cats are polyphagic, especially if they have comorbidities. Appetite stimulants, such as mirtazapine (transdermal gel or tablets may help). Because higher doses may amplify agitation, and mirtazapine clearance is delayed in cats with CKD, I'd prescribe a conservative dose of 1 mg (¾ inch) on ear skin Q 2-3 days.

Another, Entyce® (capromorelin), is a ghrelin receptor agonist which increases appetite and stimulates growth hormone release from the pituitary, resulting in increased weight and muscle mass. Dose: 3 mg/kg = 0.1 ml/kg solution p.o. Q 24 hours.

### Gastrointestinal Signs:

Regardless of etiology, vomiting, and diarrhea should be controlled while waiting for the hyperthyroidism to resolve.

- **Vomiting:** Nauseous cats not only eat less, but they are more likely to 'lose' what they eat. If vomiting much, dispense 4 x 16 mg Cerenia® (maropitant) tablets, 1/3 to ½ tablet per cat Q 24-48 hours prn.
- **Diarrhea:** If IBD or LSA are suspected/proven, initiating appropriate medications and diets, such as prednisolone, chlorambucil, budesonide, probiotics, cobalamin, and hypo-allergenic diets may aid recovery. Because corticosteroids may worsen hypertension, it is wise to check the blood pressure prior to their use in hyperthyroid cats.

### What Should We Be Telling Our Clients?

The time before I-131 treatment until the thyroid disease resolves can be the most difficult for hyperthyroid cats. Treating various signs of illness regardless of cause helps hyperthyroid cats recover more quickly. I encourage plans to stabilize these cats before travel to our facility, to manage their signs of both hyperthyroidism and comorbidities during their hospitalization, and for continued supportive care after their return home with the owner.

I depend upon the owner's input and compliance, and the pDVM's clinical expertise and familiarity of the case to design the best treatment and recovery plans for our hyperthyroid patient. As a team, we provide the best care.

Warmest wishes this Winter!

Faythe Vaughan, DVM

For more information, and to sign up for e-Newsletters, check out our website:

[www.felinehtc.com](http://www.felinehtc.com) or email [felinehtc@gmail.com](mailto:felinehtc@gmail.com)

Please feel free to contact us with any questions or send records for a case you'd like to discuss ( see contact info above!)