

Current concepts on diagnosing and managing thyroid disease in dogs & cats

Canine Hypothyroidism

Primary hypothyroidism is due to impaired function and secretion of the thyroid hormones. Most dogs have acquired hypothyroidism that is either lymphocytic thyroiditis or idiopathic thyroid atrophy. It is most commonly diagnosed in middle-aged dogs and often affects mid- to large-size breeds. Clinical signs vary, and because the clinical signs of hypothyroidism can be indistinguishable from other diseases, it is commonly overdiagnosed. Age, breed, and systemic illness all affect thyroid hormone concentrations.

Dr. Robertson: The most common clinical signs in dogs with hypothyroidism are dermatologic conditions and signs secondary to a decreased metabolic rate. What are some of the uncommon presentations you see?

Dr. Nelson: Dogs with neurologic signs, including seizures, neuromuscular disorders, and peripheral neuropathies, are recognized. These manifestations are related to the profound hyperlipidemia (hypertriglyceridemia) that these dogs have. When the triglyceride levels are >1000 mg/dL, you may have gastrointestinal signs that mimic pancreatitis.

Dr. Scott-Moncrieff: Cranial nerve changes are not common, but they are an important manifestation of hypothyroidism and reversible with appropriate treatment.

Dr. Kintzer: There have been reports of cerebrovascular accidents as well.

Dr. Robertson: What are the typical findings you would expect on a minimum database?

Dr. Scott-Moncrieff: The classic changes on the hemogram are a mild normocytic, normochromic, non-regenerative anemia. The classic changes in the biochemical profile include very mild increases in liver enzymes and changes in the cholesterol and triglyceride values.

Canine Hypothyroidism Clinical Signs

Clinical signs develop slowly and are progressive.

Common

Lethargy, inactivity, weight gain, cold intolerance, hair loss or excessive shedding, lack of hair regrowth following clipping, dry or lusterless hair coat, excessive scaling, hyperpigmentation, recurrent skin/ear infection

Uncommon

Generalized weakness, incoordination, cardiovascular abnormalities, facial paralysis, seizures, neuropathies, infertility

The thyroid, the largest endocrine organ, influences the function of almost every organ in the body. The thyroid produces thyroxine (T₄) and triiodothyronine (T₃), which regulate the rate of metabolism and affect growth and rate of function of many other body systems. Dogs and cats both suffer from dysfunction of this important gland. The onset of thyroid disease is often insidious in pets, occurring over months to years and may not be clinically apparent from the history or the physical examination.



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Thyroid Tests Available

Total thyroxine	T ₄ or TT ₄
Total triiodothyronine	T ₃ or TT ₃
Free thyroxine	fT ₄
Thyroid-stimulating hormone	TSH
Thyroglobulin autoantibody	TgAA
T ₄ autoantibody	T ₄ AA
T ₃ autoantibody	T ₃ AA

What if the total T₄ is increased in a dog not receiving thyroid supplementation?

The normal reference interval for any test comprises results from 95% of the population, so by definition 5% of normal dogs will have a T₄ result that falls outside of the normal reference interval. True hyperthyroidism is rare and may be seen in some cases of thyroid carcinoma and adenoma. If the T₄ is increased and the dog is not on a supplement, look for clinical signs of weight loss, tachycardia, and a palpable mass in the cervical region. Consider running a fT₄ and T₄AA. A detectable TSH concentration rules out hyperthyroidism.

The large majority (~ 75%) of hypothyroid dogs have increased cholesterol values, and an even higher number have increased triglyceride values.

Testing for Hypothyroidism

Dr. Robertson: Confusion exists around the value of the various available diagnostic tests for hypothyroidism and the best protocol for ruling out or diagnosing this condition. Total T₄ can be performed in-house or at a reference laboratory. All other thyroid testing is offered only at reference laboratories. Let's begin the discussion with the value of screening for hypothyroidism using the total T₄.

Dr. Scott-Moncrieff: Total T₄ is a great screening test to rule out this disease. You need to look at it in the context of clinical signs. If a dog isn't gaining weight, doesn't have any other clinical signs, and the total T₄ is above 2 mcg/dL, I don't pursue diagnosing hypothyroidism any further.

Dr. Nelson: Total T₄ is a good screening test for normal dogs, but the problem is that most variables affecting the thyroid gland cause the T₄ to go down for various and sundry reasons, yet the thyroid gland is normal. It's a protective mechanism and very little causes it to go up. If you get a low T₄, it becomes a question of, is the animal hypothyroid or is something suppressing thyroid secretion and causing the low numbers?

Dr. Kintzer: I do a total T₄, using the SNAP Total T₄ Test, in my practice first. (A new, improved version of this test will be released in early 2011.) If a dog with clinical signs has a total T₄ above 2 mcg/dL but is still in the reference range, I start looking for something else that is causing the clinical signs. I often like the efficiency of running the test in-house because I don't have to play phone tag with the client.'

Dr. Robertson: To summarize, we all agree that if the total T₄ is well within the reference interval, hypothyroidism is extremely unlikely. However, if the T₄ is low or at the low end of the reference interval, what additional diagnostic steps do you take to establish whether a dog is hypothyroid or not?

Dr. Scott-Moncrieff: First, you need to look at the animal and its signalment. We know that total T₄ is highest at 6 months to a year of age. Over the lifetime of that animal, it is going to decrease by 60%; we should probably have age- and breed-specific reference ranges.

Dr. Kintzer: The medication history is important too. Is it an epileptic and getting phenobarbital? Did it just finish a course of trimethoprim sulfadiazine/ sulfamethoxazole for a skin infection? Or is it on an immunosuppressive dose of corticosteroids? We have to consider all of those things.

Dr. Scott-Moncrieff: But if hypothyroidism is still on your differential list and the patient has clinical signs of hypothyroidism, further testing is indicated. If the owner's resources allow, I prefer to go from a screening

test to a thyroid panel and look at everything. If not, I'm likely to start off by adding a TSH and fT_4 .

Dr. Kintzer: In the hospital where I work, I run into more economic considerations, so I usually just perform the TSH and the fT_4 and add additional thyroid tests if necessary.

Dr. Robertson: Let's talk about the individual components of the thyroid panel. How does the fT_4 differ from the total T_4 ?

Dr. Nelson: The fT_4 measures the nonprotein-bound form of circulating thyroxine, which is available to tissues. The majority of T_4 is protein-bound and is a reservoir. fT_4 is the physiologically active component that, in theory, should give you a better reading of thyroid gland function than the total T_4 . The problem is that a lot of the work done on fT_4 looked at human radioimmunoassay tests (RIAs). The human RIAs just don't work well in the dog. For a long time, equilibrium dialysis was considered the "gold standard" procedure for the measurement of fT_4 , but the test seems to have changed since it was first evaluated in the 1990s and other, newer fT_4 assays may perform just as well or better.

Dr. Kintzer: Regardless of the testing methodology, we need to remember that although the fT_4 is generally a better test than total T_4 , it's still not a perfect test to determine if a patient is hypothyroid because it can be affected by nonthyroidal illness as well.

Dr. Scott-Moncrieff: I think a fT_4 is better than a total T_4 , but the fT_4 is not as good as the 1990's papers made it look. Some people believe the fT_4 is independent of euthyroid sick syndrome, but if the animal is sick enough, the fT_4 can be low as well. Another important concept is that in an adult dog that's not systemically ill, the lower the total T_4 or the fT_4 , the more likely it is that the animal is truly hypothyroid.

Dr. Robertson: So we're looking at additive information. The fT_4 is not a substitute for the total T_4 . The total T_4 is a good screening test for suspected cases. If the total T_4 is low, the clinician should consider performing additional diagnostic tests to help confirm or rule out hypothyroidism. What additional diagnostic tests do you recommend?

Dr. Nelson: For additive value, I believe that the fT_4 is the best information for your buck. So if you had to pick a single thing, it would be the fT_4 . I go to the TSH and TgAA if the total T_4 and the fT_4 are marginal in a patient with clinical signs. If the total T_4 is low, the fT_4 is kind of low, and the TSH and antibody tests are positive, I'll start treatment.

Dr. Scott-Moncrieff: The other way to look at it is that the fT_4 adds a little additional sensitivity and the TSH adds a little specificity. So if you run those in addition to the total T_4 , and the fT_4 is low or even borderline and the TSH is high, then you know you're headed toward the correct diagnosis.

Total T_4 is a great screening test to rule out hypothyroidism. You need to look at the total T_4 in the context of clinical signs. If a dog doesn't have any clinical signs of hypothyroidism, and the total T_4 is above 2 mcg/dL, I don't pursue diagnosis any further.

Euthyroid Sick Syndrome

Euthyroid sick syndrome (ESS) refers to a condition in which dogs have a nonthyroidal illness (NTI) that suppresses the concentration of circulating thyroid hormones. The exact mechanism of the development of this syndrome is not fully understood, but it most likely involves several pathways and may be a protective response to illness. A dog with a low or low-normal T_4 concentration that has a significant NTI should have its primary disease addressed prior to performing additional thyroid diagnostics. Once the dog has recovered, if hypothyroidism is still suspected, further thyroid-function testing could be performed at this time.



Dr. Kintzer: Typically dogs with very borderline results are less affected clinically and it's not an emergency. I may wait a few months and retest.

Dr. Scott-Moncrieff: Some of the highest TSH concentrations that I've seen have been in totally asymptomatic dogs and were picked up on routine screening. These TSH concentrations were in dogs with normal T_4 results. We followed some of these dogs for months and the dogs did not develop signs of hypothyroidism. So it is important to remember that a high TSH is only specific for a diagnosis of hypothyroidism when the T_4 is concurrently low.

Dr. Robertson: The next generation fT_4 analog test will be available later this year. We evaluated this test in a clinical trial and it was shown to be as accurate as the fT_4 by equilibrium dialysis for diagnosing hypothyroidism. The advantage of this test is that it has a faster turnaround time with results that would be available with the rest of the diagnostic panel at the reference laboratory. What do you see as the clinical benefits of this new fT_4 test?

Medications That Can Affect Thyroid Testing Results

- Corticosteroids
- Nonsteroidal antiinflammatories
- Phenobarbital
- Trimethoprim sulfadiazine/sulfamethoxazole
- Iodine-containing radiocontrast agents

Dr. Scott-Moncrieff: I think any time you have a test that's cheaper it's easier to convince the owners to run it, and having a whole thyroid panel included with the other diagnostic results is helpful.

Dr. Nelson: If the precision and accuracy are comparable or better, that's great. If you can do it cheaper and faster, well that's even better.

Dr. Robertson: The TSH provides valuable information as well. Can it be evaluated alone or should it always be evaluated as part of a thyroid panel?

Dr. Scott-Moncrieff: It absolutely has to be evaluated as part of a panel. Some euthyroid dogs that are recovering from concurrent illness have an increased TSH and there is no clinical relevance to those results. The TSH assay alone should not be used as a stand-alone test.

Dr. Robertson: In your experience, what percentage of dogs with hypothyroidism have an increased TSH?

Dr. Kintzer: In my experience, probably 70% to 75% of the dogs have an increased TSH, so there are a considerable number of hypothyroid dogs whose TSH is not increased.

Dr. Robertson: I would like to discuss your approach to evaluating a dog that has had a total T_4 performed as part of a routine wellness screen along with its minimum database. The cases that cause veterinarians some difficulty are the dogs whose complete blood count (CBC) and biochemical profile are normal, but the total T_4 is low or borderline low. Evaluating a fT_4 and TSH can definitely be helpful to determine if the dog is hypothyroid or not. However, it is not uncommon for the fT_4 to also be borderline low and the TSH to be normal. In that particular patient,

would you recommend waiting a period of time and retesting, or would you consider a therapeutic trial?

Dr. Nelson: It depends on the clinical signs and the owner. If the dog is clinically healthy and the only clinical sign is that it is overweight, I would not treat that dog.

Dr. Robertson: When would you recommend reassessing this dog's thyroid function?

Dr. Nelson: If the dog's healthy, I would just say let's screen it again in 6 months to a year when we do the next exam.

Dr. Scott-Moncrieff: I would have to go on record that I'm not even an advocate of doing geriatric T_4 s. I don't see the merit. In a dog with no clinical signs of hypothyroidism, there is no clinical significance of measurement of a one-time decreased total T_4 .

Dr. Kintzer: I add T_4 as part of a panel in patients I suspect have hypothyroidism, or breeds that may be predisposed to hypothyroidism. In practice, it may become an economic issue. When the T_4 is available as an add-on to the CBC and biochemical profile, the extra cost for that T_4 is significantly less compared to what it would cost to run a stand-alone T_4 .

Dr. Scott-Moncrieff: But if you look at how a test performs, it performs best when the clinical signs support the diagnosis; ie, when the prevalence of the disease is high.

Dr. Robertson: What is the diagnostic value of determining if TgAAs are present?

Dr. Scott-Moncrieff: The TgAA is predictive of the presence of thyroiditis within the thyroid gland. Most studies suggest that it's fairly sensitive and specific for the presence of thyroiditis within the thyroid gland, although there may be some causes of transient thyroiditis, such as viral infection. There has been a suggestion that recent vaccination can also transiently cause increased TgAA. I don't know if we all agree with that, but the important concept is that thyroiditis does not equal hypothyroidism. You can have thyroiditis in the thyroid gland for years with normal thyroid function.

Dr. Kintzer: It takes a considerable amount of loss of the thyroid gland to be clinically hypothyroid. Somewhere around 80% to 90% percent of the gland must be no longer functioning before clinical hypothyroidism is seen.

Dr. Scott-Moncrieff: It is thought that a thyroid gland affected by thyroiditis will initially be antibody positive. Over time, the inflammation can resolve but the thyroid gland is destroyed, and you end up with a hypothyroid dog that is antibody negative. There is no data out there that really shows that sequential progression, but it makes sense that that would be the case.

Dr. Robertson: Is there any additive value to measuring T_3 AA and T_4 AA?

Hypothyroid Treatment

The treatment of hypothyroidism involves thyroid supplement therapy. The goal is to treat the dog with the lowest possible dose that alleviates clinical signs and keeps the thyroid concentration in the upper end or slightly above the reference interval at peak levels (about 4 to 6 hours after levothyroxine administration).

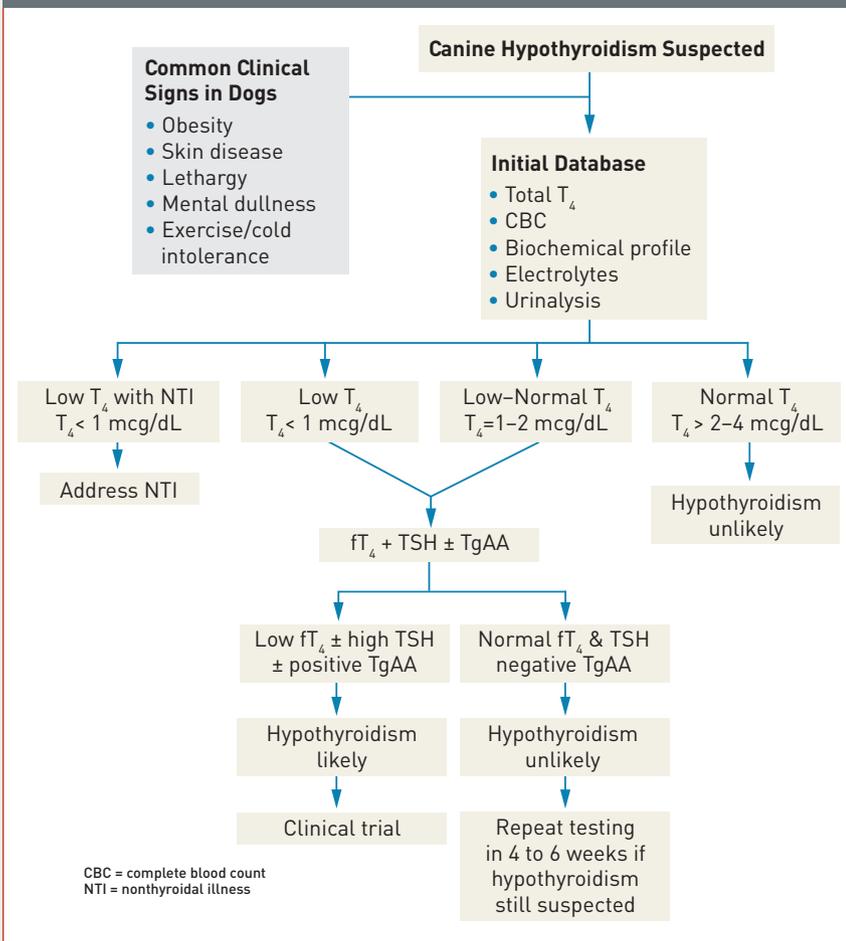
Medical therapy

- Starting dose of levothyroxine: 0.02 mg/kg Q 12 H
- Recheck every 6 to 8 weeks and adjust the dosage on the basis of serum T_4 concentrations and clinical response to therapy.
- Different brands of levothyroxine have different gastrointestinal absorption and bioavailability, so dosage may change according to the brand.
- Concurrent medication can impact the metabolism or absorption of levothyroxine and may require a change in dosage.
- Once clinical signs have resolved, some dogs may be adequately maintained on once-daily therapy.

Checking for compliance

- If compliance is a concern, a TSH concentration can be measured.
- If appropriate supplementation is being given, the TSH concentration should be low.

Canine Hypothyroidism



Dr. Nelson: If your TgAA is positive, your T_3AA and T_4AA may or may not be positive, but if your T_4AA and T_3AA are positive, however, then your TgAA is always positive.

Dr. Scott-Moncrieff: I think the only additive value, and I think it's a stretch, would be in the rare dog with overt clinical signs of hypothyroidism but a normal T_4 . You're trying to make a story that the T_4AA appears normal because of the presence of T_4AA that theoretically can specifically affect the T_4 assay.

Dr. Kintzer: I hardly ever run T_3AA and T_4AA ; only in very selective cases.

Dr. Robertson: In a small internal study at IDEXX, we collected samples from TgAA-positive dogs whose total T_4 and fT_4 were below reference interval limits and whose TSH concentrations were increased. We did not have the clinical history on these patients, but results strongly supported the diagnosis of hypothyroidism. We found that of 33 TgAA dogs, only 3 were T_4AA positive, and of 17 dogs with enough remaining serum for testing, 5 were positive for T_3AA .

Dr. Scott-Moncrieff: That fits with what has been published.

Dr. Robertson: When do you recommend a dog be rechecked after initiation of thyroid replacement therapy? How long does it take for the biochemical and hematologic abnormalities to resolve?

Dr. Kintzer: Four to 6 weeks after starting therapy, I reevaluate the patient and run either a peak or trough total T_4 to monitor therapy. If anemia or significant hypercholesterolemia or hypertriglyceridemia were present at time of diagnosis, I often recheck these as well. I check total T_4 levels 4 to 6 weeks after a change of dosage or brand of supplement, and every 3 to 6 months during therapy.

Dr. Scott-Moncrieff: When you first start treating a hypothyroid dog, some responses to therapy happen very quickly. The triglycerides drop very quickly, but it's going to take a while for some of the other manifestations of treatment to be seen. Hopefully, within a couple of weeks, the dog will have an increase in activity level, but the hair coat might actually get worse before it gets better and the skin can take 3 to 6 months to normalize. Neurologic signs typically take 2 to 3 months to show improvement. After



the clinical signs are stable, I recommend yearly rechecks unless there has been some other recurrence of clinical signs or change in body weight.

Dr. Nelson: If hyperlipidemia is creating some of the clinical signs, I would recheck fasting serum triglycerides in a week. In my experience, serum triglycerides drop quickly. You will usually see tremendous improvement in 72 to 96 hours. I usually check serum T_4 and TSH concentrations around a month after initiating treatment and adjust the dosage accordingly. Anemia can take 6 to 12 weeks to improve, so I don't usually check a CBC until after 2 to 3 months of treatment and then only if anemia was present at the time of diagnosis.

Dr. Robertson: How often do you recommend rechecking a hypothyroid dog once it is well regulated on replacement therapy?

Dr. Nelson: Once they're stable and doing well, I check them every 6 to 12 months.

Dr. Kintzer: I tend to recheck my patients more frequently. It's not necessarily as much a check on the patient as it is a check on owner compliance, so after they are stable on therapy, I try to check them every 3 to 6 months.

Feline Hyperthyroidism

Feline hyperthyroidism was first recognized as a distinct clinical entity in 1979. It has been diagnosed with increasing frequency since that time and is now considered the most common endocrine disorder of cats. The underlying causes of hyperthyroidism are unknown, but risk factors, such as breed, a diet composed primarily of canned food, and the use of cat litter, have been suggested.

Dr. Robertson: Do you think feline hyperthyroidism is more commonly diagnosed now than it used to be? Has the disease become more prevalent or have clinicians become better at recognizing hyperthyroidism earlier?

Dr. Scott-Moncrieff: I think it's a combination of things. We certainly see some cats where the diagnosis is made based on a screening geriatric profile and the owners were not aware the cat was sick. There is also a true increase in prevalence.

Dr. Robertson: What are the typical physical examination findings?

Dr. Nelson: That depends on the severity of the hyperthyroidism at the time you see the cat. If they're in the early stages, a lot won't be found on physical examination other than the thyroid nodule. If they're in the advanced stages, they can be thin and tachycardic in addition to having a large thyroid nodule.

Dr. Scott-Moncrieff: The cases that I see now often have very mild clinical signs. They have a history of weight loss and a palpable cervical nodule.

Feline Hyperthyroidism Clinical Signs

Weight loss, polyphagia, increased activity/restlessness/nervousness, hair loss/unkept coat, polyuria/polydipsia, vomiting/diarrhea/bulky stools; less commonly, decreased activity/weakness

The issue we are faced with is deciding whether a hyperthyroid cat with high liver enzymes has concurrent hepatopathy that may be more clinically relevant to the animal's survival than the hyperthyroidism. The diagnostic dilemma is, do you analyze the liver or do you treat the hyperthyroidism and see what happens?



They might be a little tachycardic and may have a heart murmur or gallop rhythm, but I don't commonly see cats with severe clinical signs.

Dr. Nelson: That's because the serum T_4 test is usually on geriatric cat chemistry panels, so the index of suspicion for hyperthyroidism is occurring earlier in its development.

Dr. Robertson: Since measuring blood pressure is becoming more routine in veterinary practice, what do you find in hyperthyroid cats?

Dr. Scott-Moncrieff: It's interesting because early studies said that 70% to 80% of hyperthyroid cats are hypertensive whereas more recent studies report that only 15% to 20% are hypertensive. This is probably because of earlier diagnosis and increased recognition of the white-coat effect. A diagnosis of hypertension should only be made after at least 2 elevated blood pressure measurements unless there is evidence of damage, such as retinal detachment.

Dr. Kintzer: A recent study showed that about 20% of hyperthyroid cats that were normotensive at the time of diagnosis developed hypertension after treatment for the hyperthyroidism. Blood pressure should, therefore, be checked both before and during treatment.

Dr. Robertson: What changes do you typically find in the minimum database of a hyperthyroid cat?

Dr. Kintzer: Some cats have a very mild increase in red blood cells. They may have a stress leukogram, although this may be caused by hospitalization. Mild increases in liver enzymes are common.

Dr. Scott-Moncrieff: Some are also azotemic, which is not related to thyroid disease, but to the fact they are geriatric cats. They may also be hypokalemic. A biochemical profile usually reveals mild to moderate increases in alanine transaminase (ALT) and alkaline phosphatase (ALP).

Dr. Nelson: The issue we are faced with is deciding whether a hyperthyroid cat with high liver enzymes has concurrent hepatopathy that may be more clinically relevant to the animal's survival than the hyperthyroidism. The diagnostic dilemma is, do you analyze the liver or do you treat the hyperthyroidism and see what happens?

Dr. Scott-Moncrieff: I think that if a cat has a really high ALT (> 800 IU/L), I am at least going to recommend an abdominal ultrasound to evaluate the liver. If the ultrasound is normal, I'm probably going to treat the hyperthyroidism before I decide to do a liver biopsy.

Dr. Robertson: What do you feel about screening healthy, middle-aged to older cats for hyperthyroidism, along with the routine CBC, biochemical profile, and urinalysis, as part of their yearly or biannual visits?

Dr. Nelson: I think that routinely screening middle-aged to older cats for hyperthyroidism is fine and seems to have become common practice for many veterinarians. If the T_4 is going up, odds are it is increasing because the cat has started to develop the disease.

Dr. Robertson: Is there a relationship between the magnitude in the increase of the total T_4 and the severity of clinical signs?

Dr. Nelson: I think there's a lot of overlap. When they get up over 10 mcg/dL or 12 mcg/dL, most of the ones that I've seen have been pretty symptomatic.

Dr. Kintzer: I don't think that it is true for every single case, but overall I think there's a relationship.

Dr. Scott-Moncrieff: I would agree with the general rule, but I think there are exceptions. I've seen cats with T_4 s of 17 mcg/dL and the only clinical sign is mild weight loss.

Dr. Robertson: For the diagnosis of hyperthyroidism, a cat may or may not have clinical signs. The most common changes in the minimum database are elevations in liver enzymes. Can an elevated T_4 on its own confirm the diagnosis of hyperthyroidism?

Dr. Scott-Moncrieff: Yes, with the exception of patients whose result is just above normal. Keep in mind that the reference interval should encompass 95% of normal cats, so occasionally a normal cat may have a result that could be right outside of this normal reference interval.

Dr. Robertson: Does a total T_4 within the normal reference interval rule out hyperthyroidism? If not, how do you confirm or rule out a diagnosis of hyperthyroidism?

Dr. Kintzer: No, a normal total T_4 does not rule out hyperthyroidism unless the T_4 is in the low end of the reference interval; ie, less than 2 mcg/dL. Otherwise, if there are clinical signs that make me suspicious of hyperthyroidism, I usually add on a fT_4 .

Dr. Scott-Moncrieff: Also, I make sure to palpate for a thyroid mass because being able to palpate a cervical mass is really important. Diagnostically, I would usually perform a fT_4 next. If the diagnosis is still in question, then it depends on the severity of the clinical signs. If you've got a sick cat and the clinical signs might be due to hyperthyroidism, then I'm more inclined to do the technetium scan to get a definitive answer right away. However, if the cat is healthy, eating well, but just losing weight, I think it is fine to wait and recheck the cat in 2 to 4 weeks. Also, if the T_4 is in the 2.5 to 4 mcg/dL range, I think in private practice the T_3 suppression test is a very appropriate option that can be done in-house or referred. I wouldn't want to discount that as an option.

Hyperthyroid Treatment

There are 3 primary treatment options available for hyperthyroid cats:

1. Medical therapy

- Starting dose: Oral or topical methimazole 2.5 – 5 mg Q 12 H
- Titrate dose: Increase in 2.5 mg/day increments
- Maintenance dose is variable; it is not common to require more than 5 mg every 12 H
- Initially recheck every 2 weeks for the first 3 months; then every 3 months once stable
- Monitor for side effects: Self-excoriation; blood dyscrasias, including anemia, leukopenia, and thrombocytopenia; hepatic toxicosis
- Monitor renal function: Titrate therapy to balance need to control hyperthyroidism while maintaining reasonable renal function

2. Radioactive iodine therapy

- Medical treatment is recommended prior to iodine-131 therapy to determine if renal function remains normal when hyperthyroidism is controlled
- Safe (if renal function is adequate) and effective
- Expensive and requires a period of isolation

3. Surgical removal of thyroid gland

- Unilateral or bilateral thyroidectomy: Can be difficult to assess without technetium scan
- Watch for the development of hypocalcemia during the initial post-operative period



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Dr. Robertson: Historically, the free T_4 by dialysis has been considered the free T_4 assay of choice. In a recent clinical trial, we evaluated the next generation free T_4 test. In cats, the test performed just as well as the free T_4 equilibrium dialysis test. The advantage of this newer test is a faster turnaround time. Do you see any benefit to this free T_4 test?

Dr. Nelson: If precision and accuracy are good and it is less expensive and faster, it is really good.

Dr. Scott-Moncrieff: I think it's important to emphasize that the fT_4 shouldn't be interpreted alone. It needs to be interpreted in the context of the total T_4 . The specificity of the total T_4 is almost 100%, whereas the fT_4 has the potential to be increased in the euthyroid patient that has concurrent illness. In these cats, the total T_4 is often below or at the lower end of the reference interval so hyperthyroidism would not even be considered.

Dr. Robertson: There are different options available for treatment of hyperthyroidism. What is your preferred treatment?

Dr. Kintzer: I put all my cats on methimazole to start and then continue based on the individual case. When the cat has no concurrent medical problems, I recommend radioactive iodine. I start with methimazole because I'm concerned with unmasking chronic renal disease. I make sure the T_4 has normalized and then recheck the cat's renal function before it is referred for radioactive iodine.

Dr. Nelson: I put them all on methimazole until they are euthyroid, and check their renal parameters. If that looks good, then I recommend iodine-131 therapy as well.

Dr. Scott-Moncrieff: The point is, there is really no way to clinically predict which cats are going to go into renal failure.

Dr. Kintzer: The other factors to consider are the client, what they can afford, and how old the cat is. If the cat is 22 years old, I'm going to put that cat on methimazole and leave it on methimazole. If it's 12 years old, I'm going to encourage the client to go to radioiodine therapy, because in the long run that is cheaper than keeping the cat on methimazole for potentially 8 years.

Dr. Nelson: Is anyone doing thyroidectomies?

Dr. Scott-Moncrieff: We do very few thyroidectomies in our practice. Occasionally we have an owner who absolutely refuses radioactive iodine because of the radioactivity and then we do a thyroidectomy. We do have referring veterinarians who still do thyroidectomies. The problem with this is that 70% of cats have bilateral disease and it requires a technetium scan to determine which cats these are. Much closer monitoring is required in cats that have a bilateral thyroidectomy.

Dr. Robertson: Do you recommend treating a middle-aged to older cat with an increased total T_4 that does not have clinical signs but you're convinced is hyperthyroid?

Dr. Scott-Moncrieff: I see cats for radioactive iodine therapy when the owners and the referring veterinarians say there are no clinical signs but evaluation of that animal shows they have a murmur, documented weight loss, or an enlarged thyroid nodule. I don't see cats that have a T_4 that's very significantly high (eg, 10 – 14 mcg/dL) that don't have clinical signs. But if they have a T_4 that is 6 mcg/dL and they don't have clinical signs, then I'd wait until they do.

Dr. Robertson: What would be the disadvantage of treating that cat? Would you potentially prevent cardiovascular changes or the development of other clinical problems?

Dr. Nelson: No, I doubt it. I would just follow that cat. I would get much more aggressive in terms of completeness of the physical examination and what is put in the medical record. I would recheck the cat in a couple of months.

Dr. Robertson: It is not uncommon for a cat with no clinical signs of hyperthyroidism to have a total T_4 that is at the high end of the normal reference interval on a wellness or preanesthetic blood screen and a fT_4 is performed and found to be increased. That's a pretty common scenario, given that almost every older cat's blood work that's sent into the lab has a total T_4 done on it. So you would follow those cats rather than recommend a technetium scan?

Dr. Scott-Moncrieff: What is the downside of waiting to make sure that increased T_4 is a persistent abnormal finding and to see if clinical signs develop? However, I would repeat the physical examination and look at the minimum database to see if there are increased liver enzymes or anything like that. If you find absolutely nothing, recheck the cat in 3 months. We just don't know how long it takes a cat to go from totally normal thyroid function to overt thyrotoxicosis, but it's probably a couple of years. It's not something that progresses very rapidly.

Dr. Robertson: What are some of the possible consequences seen secondary to treatment with methimazole?

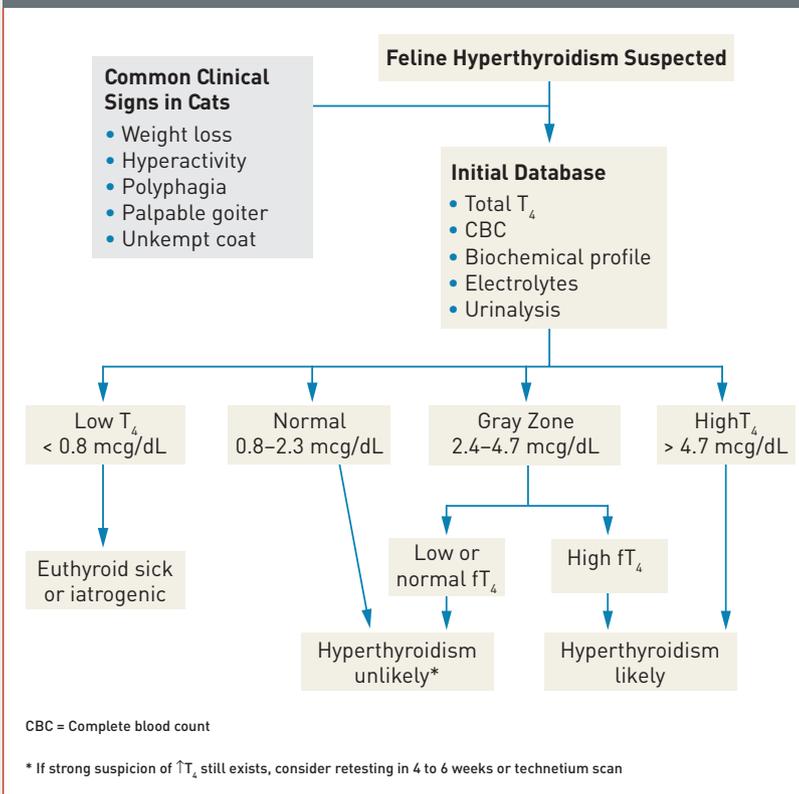
Dr. Kintzer: Cats may become anorexic and experience vomiting and/or diarrhea; rarely, self-induced excoriations to the face and neck can be seen. On blood work, various blood dyscrasias can be recognized and liver toxicity can occur in rare cases.

Dr. Nelson: I would say the most common blood dyscrasia we see is leukopenia. I've seen leukocyte counts below $2000 \times 10^9/L$. Also, if the cat has kidney disease, it is usually evident fairly quickly after it is treated with methimazole.

Dr. Scott-Moncrieff: It is important to emphasize it is not a minor change in blood urea nitrogen (BUN) and creatinine that is a concern, but a significant jump in values.

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Feline Hyperthyroidism



Dr. Nelson: The BUN and creatinine may plateau, and that's fine. Also, you don't want the T₄ to go too low. You don't want them to become hypothyroid.

Dr. Robertson: If you recheck cats on the methimazole at 2 weeks, what testing do you recommend? And how often do you recheck them?

Dr. Nelson: You should check a CBC to identify blood dyscrasias and a biochemical profile to look at the liver enzymes, BUN, and creatinine. I also try to look at a urinalysis at that time.

Dr. Kintzer: I check them every 2 or 3 weeks for the first 3 months. Once they get to the 3-month point, I check them every 3 to 6 months.

Dr. Robertson: What are your recommendations for treating a cat with chronic kidney disease that also has hyperthyroidism?

Dr. Scott-Moncrieff: I attempt to titrate the dose of the methimazole to keep the thyroid hormone at the upper end of the normal reference interval while maintaining their renal parameters in an acceptable range. Sometimes it's a hard decision. You have to pick what is causing the cat more clinical problems, the thyroid disease or the kidney disease.

Dr. Kintzer: It is a balancing act and you may not be able to normalize the total T₄ in some of these cats while maintaining a reasonable level of renal function.

Dr. Robertson: What is the prognosis for cats with hyperthyroidism?

Dr. Scott-Moncrieff: It depends a lot on the age of the cat when you begin to treat it. I think the median survival for cats that aren't in renal failure is about 4 years. Often these older cats succumb to another concurrent illness, not hyperthyroidism.

Dr. Robertson: I would like to thank our roundtable participants for a very lively and informative discussion on diagnosing and managing thyroid diseases in dogs and cats. This has been an excellent overview on how to recognize these conditions and the value of the various diagnostic tests available. Treatment and monitoring of hypothyroidism in dogs and hyperthyroidism in cats were also reviewed for our readers.