Your Complete Guide to y/d™

nutrition for managing feline hyperthyroidism


NEW
100%
Hill's
PRESCRIPTION
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Feline
Thyroid Health

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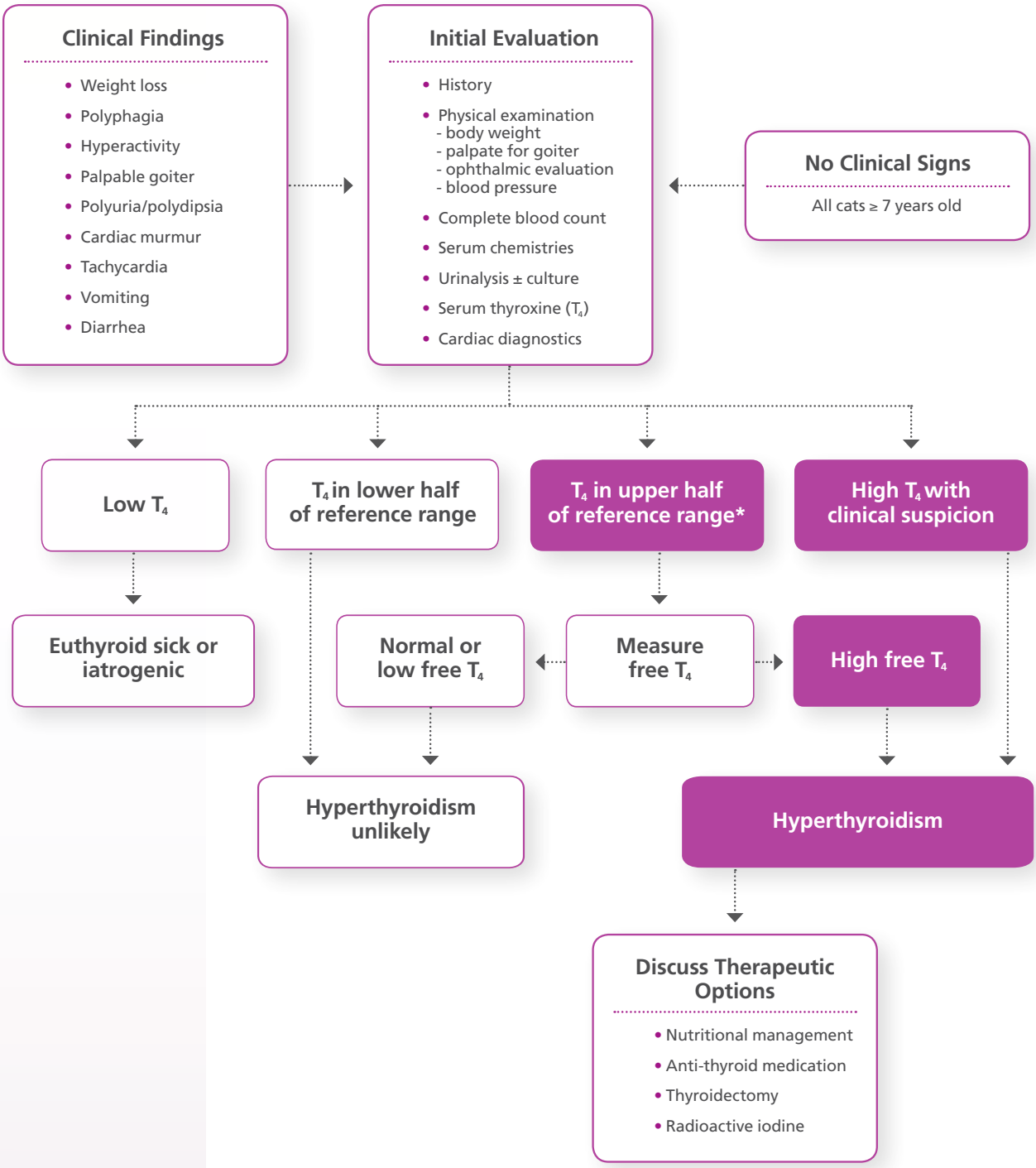
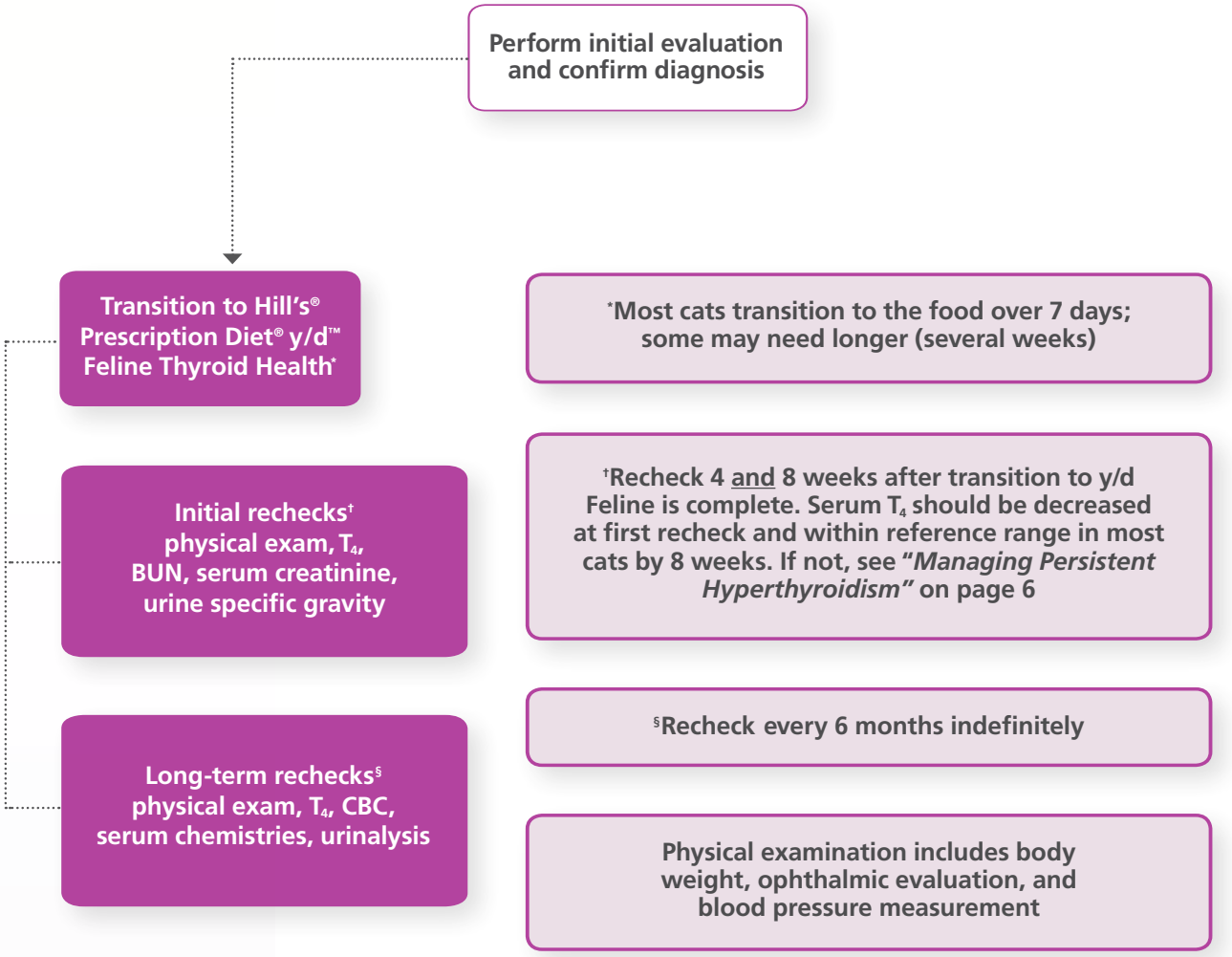
Diagnosing Hyperthyroidism in Cats



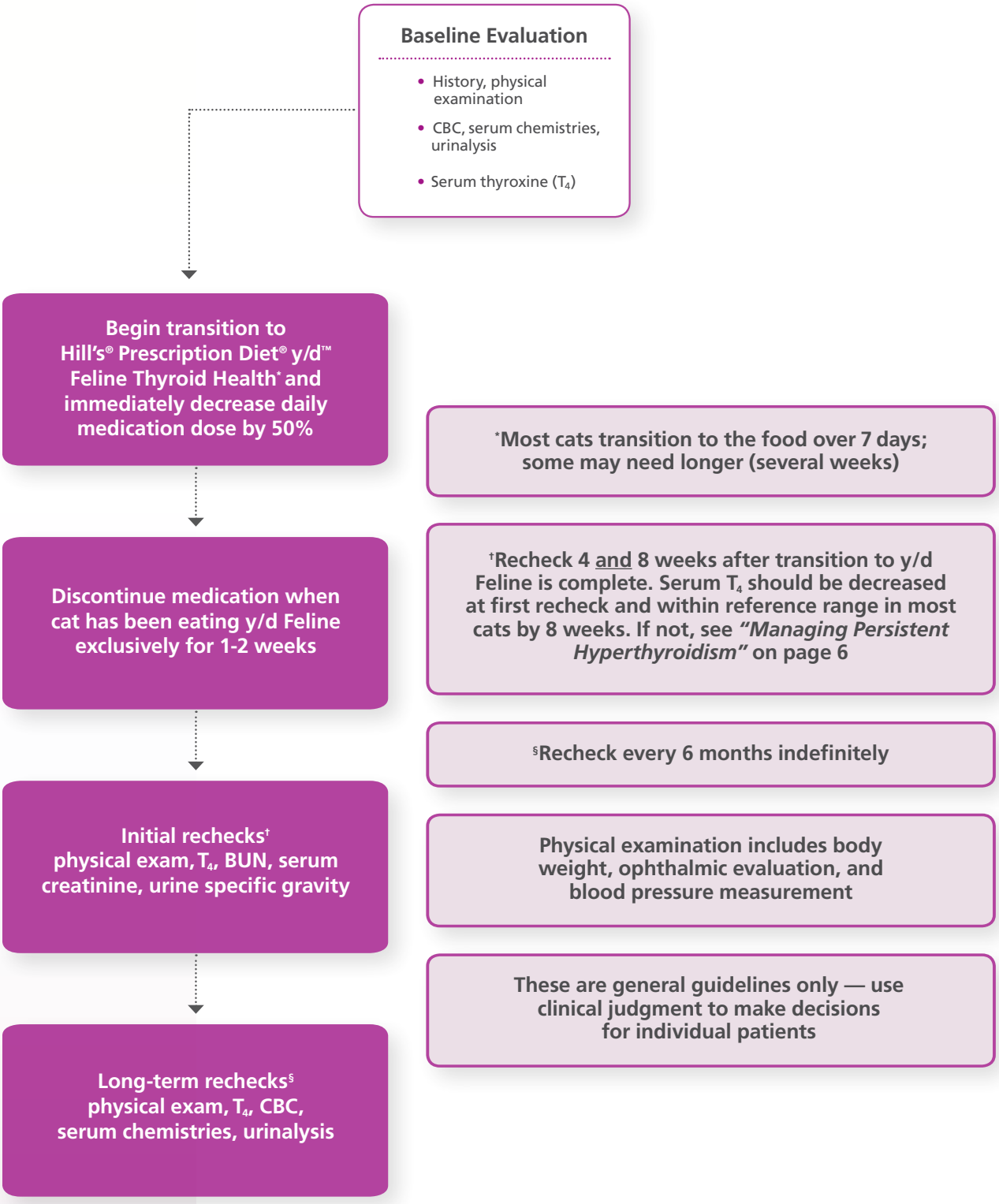
*One option is to repeat T_4 measurement in 2-4 weeks

Nutritional Management of Hyperthyroidism in Newly Diagnosed Cats



†§For cats with concurrent kidney disease, initial rechecks should occur 2, 4 and 8 weeks after transition to y/d Feline is complete and long-term rechecks should be performed every 3-4 months indefinitely.

Transitioning from Anti-Thyroid Medications to y/d™ Feline



†§For cats with concurrent kidney disease, initial rechecks should occur 2, 4 and 8 weeks after transition to y/d Feline is complete and long-term rechecks should be performed every 3-4 months indefinitely.

Guidelines for Managing Cats with Persistent Hyperthyroidism

Question	Rationale	Action
Describe how your cat spends his or her day.	Evaluate access to outside and other sources of food. Cats with unsupervised access outdoors may be ingesting other foods.	Consider confining cats indoors for 1 month and then assess effectiveness of nutritional therapy.
How many other pets are in your house?	Evaluate access to other pets' food (dogs, cats, birds, 'pocket pets', etc).	Remove all food after feeding or confine the hyperthyroid cat to areas without access to other pets' food.
What is your cat's favorite food or treat?	This is a nonthreatening way of determining if the cat is being offered treats or other food. Many owners don't consider people food or treats as part of the 'diet' or they may not mention them.	Reinforce that Hill's® Prescription Diet® y/d™ Feline must be the sole source of nutrition. Some high-iodine foods include dairy products, egg yolks, seafood, dried fruit, canned vegetables, cured meats, fresh chicken or turkey (with broth or additives injected), soy products, seaweed products (carrageen, alginate), and red dye #3 or E 127 erythrosine (found in many foods/pills that are red or brown color). Additional dietary iodine information is available on websites about thyroid health in people.
What are you feeding your cat?	Evaluate what foods are being offered and ask questions to determine what other foods are accessible to the patient.	Reinforce that y/d Feline must be the sole source of nutrition. See above for a list of common foods and ingredients that may be high in iodine.
How are you feeding your cat?	Allow owners to describe how they store, prepare and serve the food. Contamination with iodine can occur if y/d Feline is decanted and stored in containers or is served in bowls not thoroughly cleaned that have previously been used for maintenance foods.	Recommend storing y/d Feline in the original bag or can. If food is decanted into a storage container, it should be new or thoroughly cleaned (dishwasher). Likewise, the bowl/serving dish should be new or thoroughly cleaned and used exclusively for y/d Feline.
What medications or supplements are you giving your cat?	Allow owners to describe all medications and supplements.	Flavored or artificially colored medications or supplements, supplements with fish or shell fish ingredients, and liquids used by compounding pharmacies can be sources of iodine.
Who feeds your cat?	Evaluate the possibility that other members of the family are inadvertently contaminating the feeding dish or giving other foods.	Designate one person in the household to be responsible for feeding the hyperthyroid cat and cleaning the feeding dishes.
Do you have children living at home?	It's possible for cats to consume foods dropped on the floor, left on counters or offered as treats (when parents aren't watching).	Reinforce that y/d Feline must be the sole source of nutrition. See above for a list of common foods and ingredients that are high in iodine.
What is the cat's water source?	Most municipal water sources contain minute amounts of iodine; however, other sources (e.g., well water, ponds) may contain more.	Consider switching to distilled water for 1 month and then re-evaluate effectiveness of nutritional therapy.

Clinical Research Experience

To date, 90% of hyperthyroid cats managed exclusively with Hill's® Prescription Diet® y/d™ as the sole source of nutrition have become and remained euthyroid as long as the cat did not have access to other sources of dietary iodine. Serum total thyroxine concentrations returned to the normal range within 8 to 12 weeks of initiating nutritional therapy.

Answering Pet Owner Questions About y/d™

Here are some ways to address common questions a patient's owner may have about feeding y/d.

Question
Can I give my cat other medications and treats once I start feeding y/d?

Answer
In order for this special food to work, it's critical that your cat eats only y/d. Other types of food, treats or supplements could impact y/d's effectiveness. Let me know what kinds of medications, treats or supplements you are currently giving your cat so I can confirm if they are appropriate to continue after you start feeding the new food.

You can make treats by baking canned food. I have a handout I can give you to show you how. **[Photocopy the instructions on page 10 and give it to your clients.]**

Question
Can I feed y/d to the healthy cats in the house?

Answer
Yes. Foods containing amounts of iodine similar to y/d have been fed to healthy adult cats for one year with no observed side effects based on findings from physical examination, routine laboratory tests, measurement of thyroid hormone concentrations, and thyroid scans. A limited iodine food has also been used to safely manage hyperthyroidism in over 150 cats, with most of these cats eating the food for two to three years and some receiving it as their sole source of nutrition for five years.

Here are some ways to make sure all the cats in your household get the daily nutrition they need:

- Feed each cat individually so that only your hyperthyroid cat is eating y/d™
- Feed all cats y/d and supplement **only** your healthy cats' meals with 1 tablespoon of either dry or canned adult maintenance cat food each day to provide additional iodine
- Do not feed y/d to growing kittens or pregnant or lactating queens

It is critical that your hyperthyroid cat eats only y/d and no other source of nutrition.

Question
How will I know if the food is working?

Answer
Before you leave today, we'll schedule recheck appointments for four and eight weeks from now so we can perform a quick blood test to see how your cat is doing on the new food. It's also very important that you call us if you feel your cat is showing any abnormal signs or if he or she is having difficulty transitioning to the new food.

Question
Is it okay to feed y/d to my cat if my pet also has kidney disease?

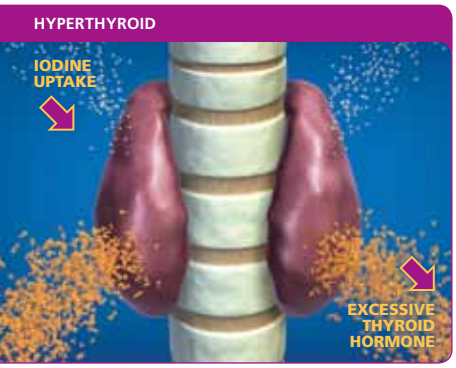
Answer
Because kidney disease is common in hyperthyroid cats, y/d was formulated with controlled amounts of protein, phosphorus and sodium, and supplemented with omega-3 fatty acids. This nutrient profile is similar to foods recommended for cats with kidney disease. Once kidney disease becomes advanced — with signs including decreased appetite, vomiting or weight loss — other nutritional management may be needed.

Follow-up for Increased Compliance

To increase compliance, check in with your client over the phone a couple of days after they begin the transition to y/d, and then again another seven to 14 days later.

Your Cat's Thyroid Health

What is hyperthyroidism?



The thyroid gland, located in your cat's neck, uses dietary iodine to produce thyroid hormones, which help regulate important body functions including your cat's:

- Metabolism
- Body temperature
- Blood pressure
- Heart rate
- Gastrointestinal (bowel) function

If your cat has hyperthyroidism, his or her thyroid gland will be enlarged and produce excessive amounts of thyroid hormone. Left untreated, hyperthyroidism can have serious, sometimes fatal, consequences on vital organs like the heart and kidneys. The good news is it can be controlled with proper veterinary care.

The importance of nutrition

If your cat has been diagnosed with hyperthyroidism, feeding Hill's® Prescription Diet® y/d™ Feline Thyroid Health brand pet food carefully limits the levels of dietary iodine to reduce thyroid hormone production and help restore thyroid health without the need for other therapy.

Recommendation for switching to Hill's® Prescription Diet® y/d™

From current food to y/d

- Gradually introduce y/d over a 7-day period*
- Mix y/d with your cat's current food, gradually increasing the amount until only y/d is fed
- Another approach is to offer your cat the new food and the current food in separate side-by-side containers which allows your cat to make choices instead of feeling forced to eat the new food suddenly

From anti-thyroid medicine to y/d

Week 1: Date:

- Introduce y/d as recommended above
- Reduce anti-thyroid medication by half*

Week 3: Date:

- Discontinue anti-thyroid medicine once your cat has been eating y/d exclusively for 1-2 weeks*

Recheck exam with veterinarian*

Week 4: Date:

Week 8: Date:

*Or as recommended by your veterinarian.

Important!

Because iodine intake from other food sources — treats, human foods, another pet's food, etc. — can compromise the effectiveness of low-iodine nutrition, it's critical that you follow your veterinarian's feeding instructions carefully and feed only y/d.

These are general guidelines only. Cats with concurrent conditions such as kidney disease or diabetes need special consideration. Your veterinarian will recommend a transition plan specific to your cat's needs.

Homemade Treat Recipes

It's important for your hyperthyroid cat to only eat Hill's® Prescription Diet® y/d™. Making the treats below will allow them to also feel spoiled and special.

Snack Triangles from Canned Food

1. Preheat oven to 350 degrees.
2. Spread ½ can of y/d onto a sheet of waxed paper.
3. Cut the flattened food into triangles, each ½ inch thick.
4. Place the triangles on a cookie sheet and bake in oven for 15 minutes.
5. Flip the triangles, and bake for another 15 minutes.
6. Let treats cool completely before serving to your cat.

Gravy from Canned Food

1. Crumble ½ can of y/d into a measuring cup.
2. Add ⅓ cup of water to the measuring cup.
3. Stir ingredients until the mixture is combined to the consistency of gravy.

Snack Cookies from Dry Food

1. Preheat oven to 350 degrees.
2. Using a blender, grind y/d kibbles into a fine powder.
3. Transfer kibble powder to a bowl, and slowly add water to form a dough consistency.
4. Shape into cookies, and place on cookie sheet.
5. Bake at 350 degrees for 30 minutes or until crispy.
6. Let treats cool completely before serving to your cat.

Important!

- All homemade treats need to be stored in a refrigerator no longer than five to seven days to maintain their freshness and prevent spoilage.
- Homemade treats should not exceed 5% of your pet's total daily intake, as baking the treats does alter the nutritional characteristics of the food.

Hill's Evidence-Based Clinical Nutrition™

A First for Feline Hyperthyroidism

Key Points

- Limiting dietary iodine (≤ 0.32 ppm) effectively lowered serum total thyroxine (T_4) concentrations and returned hyperthyroid cats to a euthyroid state.
- Serum total T_4 concentrations decreased significantly 3 weeks after feeding a low-iodine food to hyperthyroid cats.
- Adverse effects were not observed in any of the hyperthyroid cats managed with low-iodine foods.

Controlled level of dietary iodine normalizes serum total thyroxine in cats with naturally occurring hyperthyroidism *Yu S, Wedekind KJ, Burris PA, et al. J Vet Intern Med 2011;25:683-684 (abstract).*

Purpose

To determine if a test food with 0.32 ppm iodine would induce euthyroidism in cats with naturally occurring hyperthyroidism.

Design

Prior to beginning the study, 14 hyperthyroid cats were equally divided into 2 groups and fed either a commercial food with 1.9 ppm iodine or a positive control food with 0.17 ppm iodine for 6 weeks.

Cats in the commercial food group were then fed a test food with 0.32 ppm iodine for 12 weeks while the positive control group continued eating the same food for 12 weeks.

Results

Mean serum total T_4 concentrations decreased significantly in the test food group by week 3 and remained within the reference range through the end of the study (Figure 1).

Cats in the positive control group remained euthyroid during the study (Figure 2).

Conclusion

Feeding a low-iodine food (≤ 0.32 ppm iodine) maintained normal T_4 concentrations in hyperthyroid cats.

Titration of dietary iodine for reducing serum thyroxine concentrations in newly diagnosed hyperthyroid cats *Melendez LD, Yamka RM, Forrester SD, et al. J Vet Intern Med 2011;25:683 (abstract).*

Purpose

To evaluate the effects of feeding low-iodine foods to cats with naturally occurring hyperthyroidism.

Design

Ten hyperthyroid cats with serum total T_4 concentrations ranging from 4.3 to 11.4 µg/dl were included.

Initially, 5 cats were fed a food with 0.47 ppm iodine for 9 weeks. These cats along with 4 additional cats were then fed a food with 0.28 ppm iodine for 18 weeks. Finally, 8 of these cats and one newly diagnosed cat were fed a food with 0.17 ppm iodine for 4 weeks.

Serum total T_4 concentrations, complete blood counts, and serum chemistries were measured approximately every 3-4 weeks throughout the 31-week study.

Results

Eight of 9 cats (89%) became euthyroid while eating foods with 0.47 or 0.28 ppm iodine and all cats were euthyroid while eating the food with 0.17 ppm iodine.

No adverse effects were observed with feeding any of the low-iodine foods.

Conclusion

Limiting dietary iodine was a safe and effective method for lowering serum total T_4 concentrations and returning hyperthyroid cats to a euthyroid state.

Titration of dietary iodine for maintaining normal serum thyroxine concentrations in hyperthyroid cats *Melendez LD, Yamka RM, Burris PA. J Vet Intern Med 2011;25:683 (abstract).*

Purpose

To determine the maximal amount of dietary iodine that maintains normal serum total T_4 concentrations in hyperthyroid cats previously managed with a low-iodine food.

Design

Eighteen hyperthyroid cats were maintained in a euthyroid state by feeding 0.15 ppm iodine for 10 months to 3 years prior to beginning the study.

Cats were then equally divided into 2 groups and were fed either 0.39 ppm iodine or 0.47 ppm iodine for 9 weeks.

All cats were subsequently fed 0.28 ppm iodine for 15 weeks and then 0.17 ppm iodine for 4 weeks.

Serum total T_4 concentrations, complete blood counts, and serum chemistries were measured throughout the study.

Results

Serum total T_4 concentrations increased in all previously controlled hyperthyroid cats when fed ≥ 0.39 ppm iodine.

After eating the food with 0.28 ppm iodine, serum total T_4 concentrations decreased in all cats and were within the reference range for most cats, and all cats were euthyroid after eating the food with 0.17 ppm iodine.

Conclusion

Serum total T_4 concentrations were not well controlled in hyperthyroid cats eating foods with ≥ 0.39 ppm iodine.

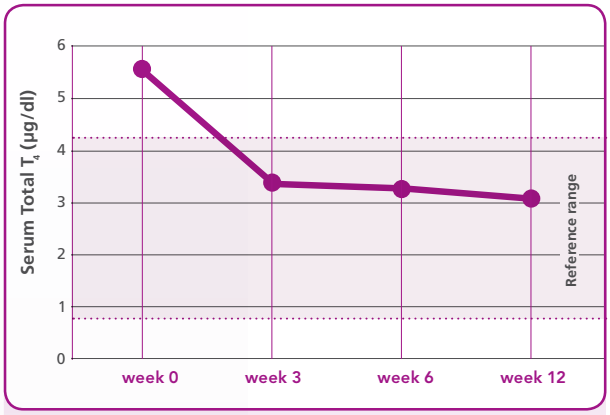


Figure 1. Mean T_4 concentrations decreased significantly ($P < 0.01$) after feeding low-iodine food (0.32 ppm) to 7 hyperthyroid cats.

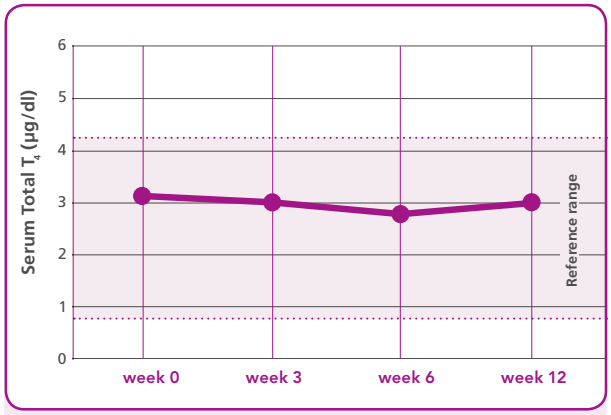


Figure 2. Mean T_4 concentrations remained normal during feeding of low-iodine food (0.17 ppm) to 7 hyperthyroid cats.

Summary

In the studies described above, researchers determined that feeding a low-iodine food effectively reduced serum total T_4 concentrations in hyperthyroid cats without negatively affecting other measures of health.

Nutritional Recommendation

Now you can manage your feline hyperthyroid patients with the nutrition of Hill's® Prescription Diet® y/d™ Feline Thyroid Health brand pet food. The first and only pet food formulated with limited iodine makes managing feline hyperthyroidism as safe and easy as feeding a cat.

Appendix

Hyperthyroidism Background – Risks, Therapies and the Opportunity of Nutritional Management

Introduction

Hyperthyroidism is now recognized as the most common endocrinopathy of older cats. Despite worldwide occurrence, the pathogenesis of feline hyperthyroidism remains unclear.

Traditional methods of managing feline hyperthyroidism include anti-thyroid medications, thyroidectomy, and radioactive iodine. Oral anti-thyroid drugs are used to control hyperthyroidism and must be given daily to achieve and maintain their effect. Surgery and radioactive iodine are designed to provide permanent solutions. All three modes of therapy are effective, but none are without risks.

Recent studies document that a new option now exists for management of hyperthyroid cats. Feeding a low-iodine food decreases thyroid hormone concentrations and alleviates clinical signs of hyperthyroidism.

Now with Hill's® Prescription Diet® y/d™ Feline Thyroid Health, management of hyperthyroidism is as safe and easy as feeding your cat.

Risk factors, etiology and nutritional review

A variety of factors have been implicated in the etiology of hyperthyroidism in cats. Epidemiologic studies have suggested increased risk of hyperthyroidism with the following:

- Ingestion of canned foods[1,2]
- Fish and giblets, and liver flavors of canned foods[3]
- Increased variety of canned foods vs. single source[4]
- Exposure to flea sprays, insecticides and herbicides[1], as well as use of cat litter

One preferred hypothesis for the cause of hyperthyroidism involves nutritional factors, because of the predominance of bilateral hyperthyroidism in cats and associations with specific food types. Iodine, selenium, soy flavonoids and quercetin have been suggested as dietary ingredients that may influence the development of abnormal thyroid function.[5,6]

In addition, endocrine disruptors (bisphenol-A) contained in the chemical linings of canned foods may be released into the food during cooking, and have been suggested as causative agents.[7] However, this proposed link between bisphenol-A and hyperthyroidism is tenuous. The potency of BPA is very low — a concentration of 200 µM is required for 50% displacement of T_3 from thyroid hormone receptors.[8] The reported range of concentration of BPA in cat foods is 13-136 ng/g of food.[9] An average 11 lb. cat consuming 100 g of food per day would consume a 3 µg/kg dose of BPA per day, or about 1/30,000 of the dose shown to induce thyroid effects in rats (100mg/kg).[10]

As a result of these dietary associations, iodine has been implicated in the cause or progression of the disease in cats. The iodine content of commercial foods is highly variable and foods can be both deficient or in excess of recommended levels.[11,12] These large variations in iodine content may reflect the highly variable iodine concentrations of ingredients used in these foods (e.g., organ tissue, fish).

It has been suggested that wide swings in daily iodine intake may somehow contribute to the pathogenesis of hyperthyroidism in cats. One study suggests chronic iodine deficiency may be a risk factor since cats consuming commercial foods without iodine supplementation, according to

listed ingredients, were more than four times as likely to develop hyperthyroidism compared with cats that ate iodine-supplemented foods.[13]

Three studies have evaluated the iodine content of commercial cat foods.[11,12,14] Results of these studies document that between the 1980s and early 2000s, commercial cat foods contained iodine concentrations that ranged from excessive (range 1–368 mg iodine/kg DMB) to non-detectable.

To date, however, the presence of iodine deficiency or excess in the diet of hyperthyroid cats has not been documented. While serum-free T_4 concentrations have been shown to be acutely affected by varying dietary iodine intake, more prolonged ingestion (5 months) of either excessive or mildly deficient iodine foods had no apparent statistical effect on serum free thyroxine levels.[15,16]

Excessive production of thyroid hormone is the hallmark of feline hyperthyroidism. Production of thyroid hormone requires uptake by the thyroid gland of sufficient amounts of iodine that are provided by dietary intake.[17]

It is not surprising that many metabolic pathways are up-regulated in the thyroid gland of hyperthyroid cats. Indeed, recent genomic studies have shown that the metabolic pathways responsible for transporting iodine into the thyroid cells and colloid for inclusion in thyroid hormones are considerably up-regulated in hyperthyroid cats.[18]

Traditional Therapy

Anti-thyroid medications, thyroidectomy, and radioactive iodine are the three traditional methods of managing feline hyperthyroidism. Each therapy has advantages and disadvantages.

Anti-thyroid Medications

The thioureylene anti-thyroid drugs (methimazole, carbimazole and propylthiouracil) are the most common medical management of hyperthyroidism in both humans and cats, because of their reliable ability to inhibit the synthesis of thyroid hormones and thereby lower serum thyroid hormone concentrations. These drugs do not affect the thyroid gland's ability to trap inorganic iodide or release preformed hormones. They are widely recommended to stabilize hyperthyroid cats prior to surgery, and are the only drugs that can be used chronically for management of hyperthyroidism.[19]

Chronic administration of anti-thyroid medications have the advantage of being readily available, requiring no special facilities, and being reasonably inexpensive — at least initially. Almost all cats are potential candidates unless thyroid carcinoma is suspected. Anesthesia and hospitalization are avoided.

On the other hand, daily administration of medication is required, and a risk of poor compliance by the owner in regularly administering the medication or the cat accepting it exists. Noncompliant patients typically relapse within 24-72 hours after the last dose.[19] Lack of compliance impacts both efficacy and cost because it compels more frequent monitoring. While use of propylthiouracil is common, it is no longer recommended because it is associated with an unacceptably high incidence of serious hematologic complications in both healthy and hyperthyroid cats.

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Hyperthyroidism Background – Risks, Therapies and the Opportunity of Nutritional Management

Methimazole is licensed for use in hyperthyroid cats in many countries (Felimazole®, Dechra Limited). Carbimazole, as a controlled-release formulation (10 or 15 mg tablets) was recently licensed for cats in Europe (Vidalta®, Schering-Plough). Methimazole and conventional carbimazole tablets are available for human use, too.

Methimazole and carbimazole can also be formulated in a pluronic lecithin organogel (PLO) for transdermal application with reasonable efficacy. However, no transdermal products are approved for use in hyperthyroid cats. Custom formulation of transdermal products increases expense of therapy and stability of the product is not guaranteed.

Methimazole and carbimazole have no effect on the underlying pathologic lesion in hyperthyroid cats, so after months to years of treatment, thyroid nodules may continue to enlarge. This hyperplasia commonly results in the need to progressively increase the daily dose of anti-thyroid drugs. Some cats may progress to a point where they no longer respond to anti-thyroid drugs and require an alternate form of therapy.[19] While many cats have been successfully managed long-term on oral therapy, the risk of adverse reactions should not be overlooked.

Most adverse reactions associated with methimazole or carbimazole occur within the first 3 months of therapy. Reported reactions include vomiting with or without anorexia, depression, and self-induced excoriations of the head and neck.

Other adverse reactions that may be experienced are mild to serious hematologic complications, including agranulocytosis and thrombocytopenia either alone or concurrently, and more rarely immune-mediated hemolytic anemia.[19] Occurrence of these serious hematologic side effects has led to the recommendation of performing screening tests (complete blood count (CBC) and platelet count) every 2 weeks initially.

Hepatic toxicity, characterized by marked increases in the hepatic enzyme activities and bilirubin concentration, has been described in less than 2% of cats treated with methimazole. Cessation of therapy is required if either serious hematologic or hepatic reactions develop. Serum antinuclear antibodies develop in approximately 50% of cats treated with methimazole for longer than 6 months, usually in cats on high-dose therapy (>15 mg/day). Although clinical signs of a lupus-like syndrome have not been reported, decreasing the daily dosage is recommended.[19]

Comparable studies have not yet been reported for carbimazole. However, given carbimazole's conversion to methimazole, a similar effect may occur.

Thyroidectomy

Thyroidectomy is a relatively simple surgical procedure that may be curative for some patients. However, to decrease the cardiac and metabolic complications associated with anesthetizing hyperthyroid cats, prior medical management and control of thyrotoxicosis are required. Once euthyroidism has been achieved, the main surgical considerations are whether to perform a unilateral or bilateral thyroidectomy, the type of technique to use, and the potential postoperative complications.[19]

Involvement of both of the thyroid lobes occurs in approximately 70% of hyperthyroid cats necessitating bilateral thyroidectomy. In 15% of cats with bilateral disease, one thyroid lobe appears grossly normal, and if left in situ will result in recurrence of hyperthyroidism within a year.[19]

Recurrence is also more likely in cats with ectopic thyroid tissue, which requires nuclear imaging facilities to diagnose. Hypoparathyroidism, resulting in hypocalcaemia, is the most significant potential postoperative complication. This generally arises only if the parathyroid glands are injured, devascularized, or inadvertently removed during a bilateral thyroidectomy.
Mild hypocalcaemia develops in most cats after bilateral thyroidectomy, but treatment is not necessary unless clinical signs develop. Fortunately, hypoparathyroidism is rarely permanent, and recovery of parathyroid function may occur days to months after surgery.

Serum thyroid hormone concentrations typically fall below the reference range for weeks to months after surgery. Historically, the recommendation has been that thyroxine supplementation is not necessary unless clinical signs of hypothyroidism occur. However, a recent study suggests that asymptomatic hypothyroidism is a risk factor for progression of chronic kidney disease in these patients.[20] Treating biochemical hypothyroidism in the absence of clinical signs may be appropriate. Owners should be advised of this possibility, particularly if the impetus for surgical therapy was to avoid the need for long-term oral medication.

Radioactive Iodine

Nearly 20% of hyperthyroid cats have multiple areas of hyperfunctional and/or intrathoracic thyroid tissue making surgical thyroidectomy ineffective. Radioiodine treatment is often considered the best option for many cats since:

- It has the potential to eliminate a benign thyroid tumor or abnormal thyroid tissue with a single treatment
- It is not dependent on the location of the hyperfunctional thyroid tissue
- No general anesthesia is required
- Side effects are minimal

Response to this therapy is potentially adversely affected by markedly increased pretreatment T_4 concentrations, increasing size of goiter, the severity of clinical thyrotoxicosis, and pre-existing kidney disease.[19]

Like stable iodine, ^{131}I is actively concentrated by the thyroid gland. It has a half-life of 8 days and emits both ß-particles and γ-radiation. The ß-particles are responsible for the majority of tissue destruction, but are only locally destructive, traveling a maximum of 2 mm. Therefore, no significant damage to adjacent parathyroid tissue, atrophic thyroid tissue, or other cervical structures is expected.

The aim of therapy is to restore euthyroidism with the smallest possible single dose of radiation while avoiding the development of hypothyroidism.[19] Controversy exists as to the best method of calculating the optimum dose for an individual cat.

Approximately 30% of cats are estimated to become hypothyroid greater than 3 months after radioactive iodine therapy.[21] As previously mentioned, therapy for asymptomatic hypothyroidism may decrease the risk of progressive chronic kidney disease. Owners should be advised of this possibility particularly if the motivation for ^{131}I therapy was to avoid the need for long-term oral medication.

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Hyperthyroidism Background – Risks, Therapies and the Opportunity of Nutritional Management

The main limitation to widespread use of radioactive iodine is the requirement for special licensing and the isolation of the cat for variable periods after treatment. This can range from several days to several weeks depending on state or local radiation regulations and, particularly, the dose.[19]

Prognosis for Traditional Therapies

Several studies have estimated the survival time of cats after treatment for hyperthyroidism.[22-24] The largest study, published in 1995, included over 500 cats evaluated prospectively and treated with radioactive iodine. The mean survival time was 24 months (range 2 weeks to 7 years).[24] The percentage of cats alive at 1, 2, 3, and 4 years after treatment was 89%, 72%, 52%, and 34%, respectively.

There are few studies that directly compare the outcomes of the different treatment methods. One retrospective study suggests that when cats with pre-existing kidney disease are excluded, the median survival time is:

- 2 years for cats treated with methimazole alone
- 4 years for cats treated with radioactive iodine alone
- ~5 years for cats treated with methimazole followed by radioactive iodine[24]

The shorter survival time in cats treated with methimazole may be related to owner/cat compliance or adverse drug reactions, or may represent a bias in case selection for the different treatments. Cats referred for radioiodine therapy are generally younger and healthier than those that are not.[24] The most commonly reported causes of death in cats treated for hyperthyroidism are non-thyroid malignancy and kidney disease.[22-24]

Nutritional Management of Hyperthyroidism

A therapeutic food, Hill's® Prescription Diet® y/d™ Feline, was developed based on the hypothesis that feline hyperthyroidism can be managed nutritionally by limiting the amount of dietary iodine available for production of thyroid hormones.

Three studies have documented the safety and efficacy of y/d as the sole management method in cats with naturally occurring hyperthyroidism.[25-27] These studies were designed to determine:

- The magnitude of iodine limitation necessary to return newly diagnosed cats to a euthyroid state[26]
- The maximum level of dietary iodine that will maintain cats in a euthyroid state[25]
- The efficacy of a therapeutic food formulated based on the previous studies to control naturally occurring hyperthyroidism in cats[27]

The results of these studies support the conclusion that a therapeutic food with dietary iodine levels at or below 0.32 ppm dry matter basis (DMB) provides an effective and safe therapy for cats with naturally occurring hyperthyroidism.

For additional details on these studies, see pages 11-12.

Adverse Effects of Nutritional Therapy

Based on the studies completed to date, no adverse effects of nutritional therapy have been noted.[28] Biochemical markers of renal function have remained stable and no other serum chemistry abnormalities have been observed. There also have been no reports of hypothyroidism.

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[28]Data on file. Hill's Pet Nutrition, Inc.

Appendix

y/d Nutrition Information

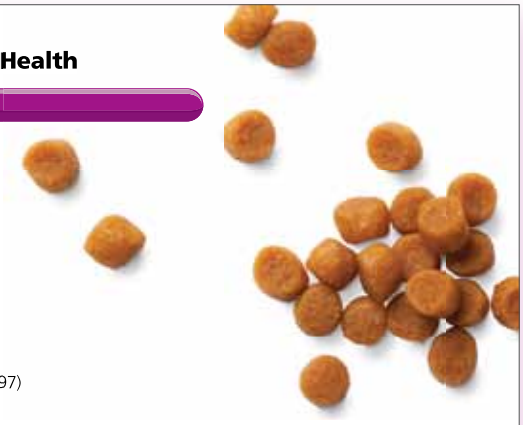
Prescription Diet® y/d™ Feline Thyroid Health

Prescription Diet® y/d™ Feline Thyroid Health

Hyperthyroidism

y/d™ Feline: Cans of 5.5 oz (1496) in cases of 24

y/d™ Feline: Bags of 4 lbs (1497)
Bags of 8.5 lbs (1597)



Indication

Hyperthyroidism

Not recommended for

Growing kittens, pregnant or nursing cats.

Evidence-Based Clinical Nutrition

- Limited iodine intake to control thyroid hormone (T_4) production.[1-3]
- Improves thyroid health in 3 weeks (when fed as the sole source of nutrition).[1]
- Clinically proven nutrition to restore thyroid health, no pilling necessary.[1-3]

Additional information

- Complete daily nutrition with a taste cats love.

IMPORTANT

- Because iodine intake from other food sources — treats, another pet's food, etc. — can compromise the effectiveness of low-iodine nutrition, it's critical that your hyperthyroid patient is fed only **Prescription Diet® y/d™ Feline**.

DAILY FEEDING AMOUNTS

Supplementation beyond the analogous canned or dry formula is unnecessary and may decrease the effectiveness of the food. **The following amounts are a starting point only and should be adjusted as needed to maintain proper weight.** When feeding for the first time, mix increasing amounts of the pet's new food with decreasing amounts of the old food over a 7-day period.

Body Weight (lb)	Can(s) (5.5 oz)	Dry – Cups
6	¾ – 1	¼ – ⅜
10	1 ¼ – 1 ⅔	⅜ – ⅝
14	1 ½ – 2	½ – ¾
18	1 ¾ – 2 ½	⅔ – ⅞

1 cup is equal to 2 ½ cans. 1 can is equal to ⅜ cup.

Other products to consider

No other products have the carefully limited iodine level of **Prescription Diet® y/d™ Feline** to manage feline hyperthyroidism.

These characteristics make **Prescription Diet® y/d™ Feline** veterinary exclusive pet food useful as a nutritional therapy for cats with hyperthyroidism:

KEY BENEFITS

Iodine	Limited levels	Restores thyroid health by reducing T_4 hormone production.
Phosphorus & Sodium	Controlled levels	Helps support kidney health.
Taurine & Carnitine	High	Helps ensure optimal heart health.
Omega-3 Fatty Acids	High	Helps support kidney health.
Target Urine pH*	6.4 – 6.6	Supports urinary tract health.

**Urine pH of individual cats may vary due to complicating factors such as time of feeding before urine collection, type of urine collection, individual animal variation, and test methodology.*

[1]Yu S, Wedekind KJ, Burris PA, et al. Controlled level of dietary iodine normalizes serum total thyroxine in cats with naturally occurring hyperthyroidism. *J Vet Intern Med* 2011;25:632-767. Abstract.
[2]Melendez LD, Yamka RM, Forrester SD, et al. Titration of dietary iodine for reducing serum thyroxine concentrations in newly diagnosed hyperthyroid cats. *J Vet Intern Med* 2011;25:683. Abstract.
[3]Melendez LD, Yamka RM, Burriss PA. Titration of dietary iodine for maintaining normal serum thyroxine concentrations in hyperthyroid cats. *J Vet Intern Med* 2011;25:683. Abstract.

INGREDIENTS — CANNED

y/d™: Water, Liver, Meat By-Products, Chicken, Whole Grain Corn, Rice Flour, Chicken Fat (preserved with mixed tocopherols and citric acid), Chicken Liver Flavor, Powdered Cellulose, Calcium Carbonate, Fish Oil, Dried Yeast, Potassium Chloride, L-Lysine, DL-Methionine, Guar Gum, Vitamin E Supplement, Taurine, Choline Chloride, Salt, L-Cysteine, Thiamine Mononitrate, L-Carnitine, Dicalcium Phosphate, Ferrous Sulfate, Zinc Oxide, Ascorbic Acid (source of vitamin C), Niacin, Copper Sulfate, Manganous Sulfate, Pyridoxine Hydrochloride, Beta-Carotene, Calcium Pantothenate, Vitamin B12 Supplement, Riboflavin, Biotin, Vitamin D3 Supplement, Folic Acid.

AVERAGE NUTRIENT CONTENTS

	As Fed[1]	Dry Matter[2]	As Fed, Caloric Basis[3]
Protein	9.9 %	34.1 %	8.2 g
Fat	7.5 %	25.9 %	6.2 g
Carbohydrate (NFE)	9.1 %	31.4 %	7.5 g
Crude Fiber	0.9 %	3.1 %	0.7 g
Calcium	0.25 %	0.86 %	207 mg
Phosphorus	0.17 %	0.59 %	141 mg
Sodium	0.07 %	0.24 %	58 mg
Potassium	0.25 %	0.86 %	207 mg
Magnesium	0.018 %	0.062 %	15 mg
Taurine	0.07 %	0.24 %	58 mg
Iodine	0.1 mg/kg (ppm)	0.2 mg/kg (ppm)	4.81 µg/100 kcal
Vitamin E	231 IU/kg	797 IU/kg	19.14 IU/100 kcal
METABOLIZABLE ENERGY			
kcal/kg	1,207	4,162	
kcal/can	188		
% Calories from:	Protein 27 Fat 49	Carbohydrates 24	

INGREDIENTS — DRY

y/d™: Corn Gluten Meal, Animal Fat (preserved with mixed tocopherols and citric acid), Whole Grain Corn, Soybean Mill Run, Dried Egg Product, L-Lysine, Chicken Liver Flavor, Potassium Citrate, Lactic Acid, Dicalcium Phosphate, vitamins (L-Ascorbyl-2-Polyphosphate (source of vitamin C), Vitamin E Supplement, Niacin, Thiamine Mononitrate, Vitamin A Supplement, Calcium Pantothenate, Riboflavin, Biotin, Vitamin B12 Supplement, Pyridoxine Hydrochloride, Folic Acid, Vitamin D3 Supplement), Fish Oil, Choline Chloride, Calcium Carbonate, Calcium Sulfate, DL-Methionine, Taurine, Vitamin E Supplement, L-Tryptophan, Natural Flavor, minerals (Ferrous Sulfate, Zinc Oxide, Copper Sulfate, Manganous Sulfate), L-Carnitine, preserved with Mixed Tocopherols and Citric Acid, Phosphoric Acid, Beta-Carotene, Rosemary Extract.

AVERAGE NUTRIENT CONTENTS

	As Fed[1]	Dry Matter[2]	As Fed, Caloric Basis[3]
Protein	34.1 %	36.3 %	8.2 g
Fat	24.2 %	25.7 %	5.8 g
Carbohydrate (NFE)	26.9 %	28.6 %	6.5 g
Crude Fiber	2.9 %	3.1 %	0.7 g
Calcium	0.89 %	0.95 %	215 mg
Phosphorus	0.62 %	0.66 %	150 mg
Sodium	0.24 %	0.26 %	58 mg
Potassium	0.78 %	0.83 %	188 mg
Magnesium	0.063 %	0.067 %	15 mg
Taurine	0.32 %	0.34 %	77 mg
Iodine	0.2 mg/kg (ppm)	0.2 mg/kg (ppm)	4.53 µg/100 kcal
Vitamin E	837 IU/kg	890 IU/kg	20.18 IU/100 kcal
METABOLIZABLE ENERGY			
kcal/kg	4,147	4,482	
kcal/cup	519		
Weight oz/cup	4.4		
Cups per lb	3.63		
% Calories from:	Protein 28 Fat 49	Carbohydrates 23	

[1]Differs from label guarantees which are either maximums or minimums. [2]The nutrient in the product after moisture is removed. It is used to make direct comparisons of nutrient profiles with differing moisture contents. [3]Nutrient intake for every 100 kilocalories consumed.

Appendix

Frequently Asked Questions

Question
Are there any contraindications for the product?
Answer
Growing kittens, pregnant or nursing cats

Question
Will there be a compatible treat available?
Answer
There is not a low-iodine treat available at this time. It is critical that owners avoid feeding any additional foods or treats to hyperthyroid cats being managed with y/d to avoid compromising the food's effectiveness. Owners who want to treat their cats should be encouraged to use canned food as a "treat."

Question
What is the shelf life for unopened dry and canned product?
Answer
24 months for dry or canned product

Question
What is the shelf life for opened product?
Answer
When dry product is stored as recommended in a cool dry place, it can be fed up to the Best Before Date.

Question
Will cats become hypothyroid while eating this food?
Answer
In all of our studies to date, hypothyroidism has not occurred in hyperthyroid or healthy cats when fed y/d. If this occurs in hyperthyroid cats while receiving concurrent anti-thyroid medication, discontinue the medication.

Question
What is the feeding recommendation for cats with concurrent diseases?
Answer
Chronic kidney disease is the most common concurrent condition of hyperthyroid cats. Similar to therapeutic renal foods, y/d contains controlled amounts of protein, phosphorous and sodium, and is supplemented with omega-3 fatty acids. It may, therefore, be used for managing cats with hyperthyroidism and chronic kidney disease.

Diabetes mellitus may also occur in cats with hyperthyroidism. Nutritional therapy is also a cornerstone of the management of type II diabetes in cats. Recent studies suggest foods that contain 5% to 26% of calories from carbohydrates help maintain glycemic control in diabetic cats.[1-5] The percent of calories from carbohydrates in y/d (23% dry, 24% canned) fall within these guidelines.

For any patient with multiple diseases, the clinician must weigh the pros and cons of managing each disorder and decide which one has the greatest impact on longevity and quality of life. Additional information and recommendations for nutritional management of complicated clinical cases is available from the Hill's Veterinary Consultation Service. This service provides free total case management, nutritional counseling and product support for veterinary hospitals. The Veterinary Consultation Service can be contacted by phone at 1-800-548-VETS (8387) or by e-mail through the HillsVet.com website.

Question

Hyperthyroidism has potential to mask kidney disease. Will the nutritional profile of y/d also aid in lessening the clinical signs of kidney disease?

Answer

Chronic kidney disease is a common concurrent condition in hyperthyroid cats and effective management of hyperthyroidism may unmask kidney disease. Amounts of protein, phosphorus, and sodium and omega-3 fatty acids in y/d are similar to Hill's® Prescription Diet® g/d® Feline Early Cardiac-Healthy Aging, a food that Hill's recommends for early stages of kidney disease. To date, we have not observed a sudden worsening of renal function (based on evaluation of serum chemistries) in hyperthyroid cats once they are eating y/d. Instead, serum creatinine often decreases after hyperthyroid cats transition to y/d; additional studies are needed to determine why this occurs. Because each patient is unique, we recommend calling the Hill's Veterinary Consultation Service for advice on managing hyperthyroid cats with concurrent disorders.

Question

If my patient eats another iodine source, when should I become concerned?

Answer

You should be concerned if T_4 values exceed the normal range. It is expected that cats from time to time may consume iodine from another source (e.g., prey, food of another pet in the house, human food, etc.). These "slips" should not cause problems if they occur infrequently, similar to what would be expected if a cat being managed with anti-thyroid medication misses a dose or does not swallow.

Appendix

Question
What causes hyperthyroidism?

Answer
At this time, the cause is unknown. A variety of risk factors have been identified for hyperthyroidism in cats and these studies show an association between the disease and the risk factor. However, they do not confirm a cause-and-effect relationship. Additional study is indicated to identify the cause(s) of hyperthyroidism.

Question
Can y/d be used to prevent occurrence of hyperthyroidism in cats?

Answer
Since the cause of hyperthyroidism is unknown, there is no expectation that limiting iodine intake will prevent the development of the disease. To date, there have been no clinical studies to support that iodine intake levels (high or low) cause hyperthyroidism.

Question
Why is there an ingredient difference between the dry and canned forms?

Answer
Canned and dry foods often have different ingredients, but Hill's takes great care to ensure the nutritional profiles are similar. The manufacturing process does not always make it possible to use the same ingredients. Dried foods must have some ability to stick together and form kibbles, whereas canned products do not.

Question
What is the source of the liver protein?

Answer
The source of liver protein is pork liver.

References

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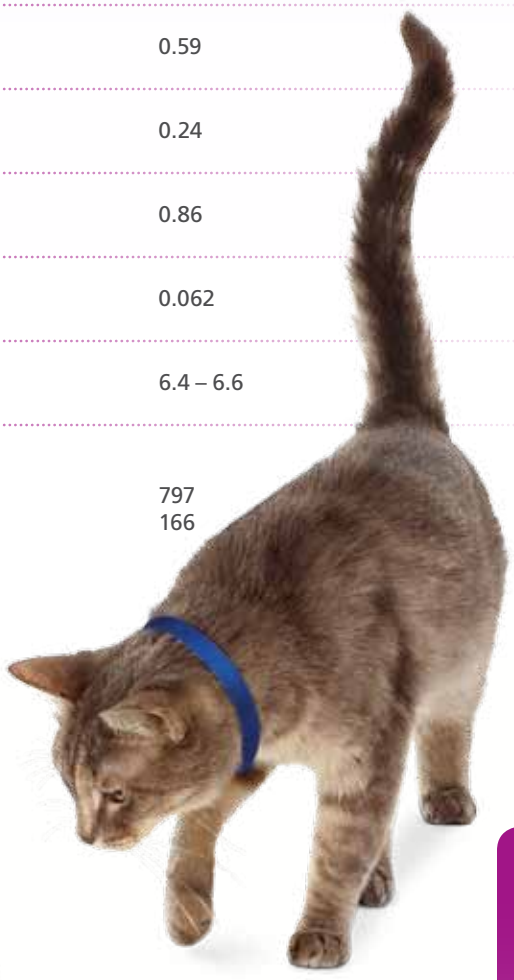
Key Nutritional Factors

Key Nutritional Factors Normal Senior Cat with Hyperthyroidism	Hill's® Prescription Diet® y/d™ Feline Thyroid Health	
	Dry	Canned
Iodine (ppm)	0.1 – 0.3	0.1 – 0.3	0.1 – 0.3
Energy density (kcal ME/g)	4.0 – 4.5	4.412	4.162
Fat (% DMB)	18 – 25	25.7	25.9
Fiber (% DMB)	≤ 5	3.1	3.1
Protein (% DMB)	30 – 45	36.3	34.1
Calcium (% DMB)	0.6 – 1.0	0.95	0.86
Phosphorous (% DMB)	0.5 – 0.7	0.66	0.59
Sodium (% DMB)	0.2 – 0.4	0.26	0.24
Potassium (% DMB)	≥ 0.6	0.83	0.86
Magnesium (% DMB)	0.05 – 0.1	0.067	0.062
Average Urinary pH	6.4 – 6.6	6.4 – 6.6	6.4 – 6.6
Antioxidants			
Vitamin E (IU/kg DMB)	≥ 500	890	797
Vitamin C (mg/kg DMB)	100 – 200	134	166



Adapted from *SACN* 5th edition Hand et. al. Mark Morris Institute, Page 391

Contact Us

Access these resources for more information or answers to questions.

For healthcare team members:

- HillsVet.com/Thyroid
- Hill's Veterinary Consultation Service at 1-800-548-VETS (8387)
- Hill's Board on vspn.org and vin.com

@HillsVet.com

For pet owners:

- HillsPet.com/Thyroid
- CatThyroidHealth.com
- Hill's Consumer Affairs at 1-800-445-5777

Facebook.com/HillsPetUS

Notes

Hill's PRESCRIPTION DIET

Clinical Nutrition to
Improve Quality of Life™