FEEDING CATS WITH HYPERTHYROIDISM

When treating cats for hyperthyroidism, most of us focus on the treatment that best cures (I-131) or manages (methimazole) their disease. However, it’s crucial to realize that nutrition plays a role their recovery. Aside from any remaining non-thyroidal illnesses, the most significant factor affecting a cat’s recovery from hyperthyroidism is his diet.

In addition, dietary measures may help minimize the risk or recurrence of hyperthyroidism. Recent research identifies chemicals and ingredients in foods and packaging that disrupt endocrine function and are best avoided.

In order to address the most common question clients ask us at the Feline Hyperthyroid Center, “What’s the best diet to feed my hyperthyroid cat?”

We need to keep 3 key points in mind:

- **Our patients are obligate carnivores**
- **They are aging**
- **And they have a catabolic disease causing muscle-wasting**

In other words, they’re sick, old, carnivores, often dealing with added complications such as glucose intolerance or renal failure, each a factor influencing our patients’ nutritional needs.

Any discussion about feline nutrition calls for a review of what carnivores need and why.

Carnivore Basics

Because cats have continued to capture their own food up until a half-century ago, there hasn’t been much evolutionary push to change genetically from their efficient little desert ancestors living in the Fertile Crescent 10,000 years ago. Cats are still obligate carnivores that rely on nutrients in animal tissues to meet their specific and unique nutritional requirements.

In the wild, a cat’s normal diet of prey (rodents, birds, lizards, etc.) provides a high amount of meat-based protein (50-70%), with a moderate level of fat (30-50%) and less than 2% carbohydrates. They obtain most of their water from their diet as well.

Protein:

Cats are metabolically adapted to use protein and fats as **energy** sources, so they have increased need for dispensable protein. This requires them to use protein to maintain their blood glucose levels, even when their diet lacks enough protein. Omnivores, such as humans and dogs, differ in that when fed a low-protein diet, they can conserve amino acids by reducing activities of enzymes involved in protein catabolism. They simply reduce their protein utilization, and use carbohydrates for energy. Cats can’t make the switch; if cats don’t have enough protein in their diets, they’ll burn their own muscle for energy.

Cats also need **specific amino acids** in their diet: taurine, arginine, methionine, and cysteine. The likely reason that synthetic pathways for these amino acids, which are found in omnivorous species, are not found in cats is that they are redundant and, thus, energy inefficient. They don’t need to make what they can eat. This may be ‘metabolically efficient’, but means that cats need to eat high
amounts of these specific amino acids in their meat because they can’t synthesize their own.

Not only do cats need more protein, it has to be meat-based. Plant-based proteins that work well for us omnivores do not contain the full complement of amino acids required by carnivores. Properly composed and utilizable amino acid sequences, found only in meat, are referred to as high biologic value (BV) proteins. Meats are high biologic value for cats and plant proteins are low.

Carbohydrates:

Cats lack many enzymes and metabolic pathways needed to digest carbs very well

For example, they have no amylase in their saliva, and low activity of pancreatic amylase used to break down carbs in the intestines. They have no fructokinase needed to metabolize simple sugars. They are also lack enzymes (glucokinase) and pathways responsible for converting glucose to glycogen for storage in the liver or muscles. As a result, cats are more hyperglycemic after high-carb meals, and carbs that aren’t used for energy or stored as muscle glycogen are stored as fat. Cats on high-carb diets are more likely to have higher fat to muscle ratios, a greater tendency toward obesity, and are more likely to develop diabetes.

Fats:
In carnivores, fat provides a lot of the fuel for energy. It also increases palatability. Meat-based diets, containing animal fats, supply essential fatty acids to cats, including linoleic, linolenic and arachodonic acids, precursors for prostaglandins and leukotrienes.

Water: Cats have a low thirst drive and are designed to ‘eat’ water in their meat meals (prey or canned food).

Sarcopenia of Aging

Old cats need even more protein

Cats lose muscle mass as they age. Age-related muscle loss is referred to as sarcopenia, from the Greek “poverty of flesh”. Lean body mass (muscle) drops dramatically in cats older than 12 years. This is due both from an increased energy requirement in older cats, as well as a reduced ability to digest protein. If inadequate amounts of meat protein are not ingested, these older cats develop a negative nitrogen balance and may burn their own muscle for energy.

Hyperthyroidism is a Catabolic State

Hyperthyroidism accelerates the cat’s metabolism, and energy expenditure, and, as previously noted, carnivores use mostly proteins rather than carbs for energy.

With ‘run-away train’ metabolisms, these cats simply burn calories faster than they can eat them, and resort to catabolizing (breaking down) their own muscle. This is first noticed as a loss of muscle over the spine.

Because polyphagia drives many hyperthyroid cats to eat ravenously, they may even gain a little weight in the initial stages of the disease, expressed as a higher overall body condition score (BCS).
These cats may retain their belly fat despite steady muscle wasting. Therefore, muscle condition scores (MCS) more accurately reflect these hyperthyroid cats’ lean body conditions than overall body condition scores (BCS) which include fatty weight.

Eventually, the muscle wasting accelerates and they lose any remaining fat, resulting in generalized emaciation. The heart also suffers thyrotoxic insult, making it reasonable to assume that sufficient quantities of high BV proteins could aid remodel and repair of cardiac muscle after resolution of thyroid disease via I-131.

**It’s Complicated: Other Issues in HT4 Cats Affecting Nutritional Needs**

**Prediabetes**

In addition to their catabolic state, hyperthyroid cats commonly develop changes in glucose and insulin metabolism leading to pre-diabetes. Even if this isn’t recognized (commonly mistaken for “stress hyperglycemia”) or remains subclinical, it does impact the nutritional needs of the hyperthyroid cat. Hyperthyroidism influences cats’ ability to respond to insulin. Hyperthyroidism frequently causes mild insulin resistance, and reduced secretion, leading to a prediabetic state. Occasionally, an untreated hyperthyroid cat will develop overt diabetes mellitus, which is more difficult to control. Some cats develop diabetes after the hyperthyroidism is corrected because the alterations in glucose tolerance and insulin secretion can’t always be reversed completely, especially if the cat is allowed to become overweight once the metabolic rate decreases to normal.

**Secondary Renal Hyperparathyroidism**

30-50% of hyperthyroid cats develop hyperphosphatemia, and about 60% have elevated parathyroid hormone levels, perhaps due to underlying and often masked chronic kidney disease (CKD). In turn, both high phosphorus and high PTH levels caused by secondary renal hyperparathyroidism accelerate renal degeneration.

**Non-thyroidal Illnesses**

Hyperthyroid cats often have concomitant non-thyroidal illnesses (NTI’s), such as CKD or independent GI diseases, each with their own dietary considerations.

Combine the nutritional demands of hyperthyroidism with those of any non-thyroidal disease(s) the cat may be dealing with, and it becomes clear how important a nutritional strategy becomes.

**Nutritional Strategy; What Should We Feed These Cats?**

Even though it’s difficult to duplicate natural diets of prey with commercial cat foods, we should strive toward this model expressed in terms of metabolizable energy (ME), dry matter basis

> 40% protein, ~50% fat, <10% carbohydrate

**High Amounts of Meat-based Protein**

Even with the treatment of hyperthyroidism, recovery of muscle may be prolonged, taking weeks to months. Restoring muscle in old cats with long-lasting alterations in glucose metabolism requires a diet rich in high biologic value (meat-based) protein, ideally for the rest of their lives.
Animal protein is more expensive than plant protein, fat, and carbohydrate sources (grains, potatoes, and vegetables). Therefore, many canned and ALL dry cat foods include high amounts of plant origin proteins and inadequate amounts of meat. Diets using whole grains or glutens (gluten = plant-based protein), and soy have a portion of their protein coming from low biologic value sources.

**Low Carbohydrates: NO fruits, No Vegetables, No Grains**

Because many cats recovering from thyroid disease still have subclinical diabetes, with continued glucose intolerance and insulin resistance even after the HT4 is corrected, a diet low in carbohydrates (<10% ME) is even more important.

Feeding a low carb diet lessens hyperglycemia, improve insulin sensitivity, and helps stabilize glucose metabolism in these cats.

Low carb diets can help prevent obesity after the thyroid disease is cured, and may help prevent the development of overt diabetes mellitus.

“Grain-free” does not necessarily mean “low-carb”. Potatoes and peas are often used in “grain-free” products, which may result in a high carbohydrate diet. This is why it is important to consider the composition (% calories from protein/fat/carbohydrate) and not just the ingredient list “gravy” foods tend to be high in carbohydrates.

The easiest way to avoid carbohydrates in cat foods is to select foods containing no fruits, vegetables or grains.

It turns out that many of the over-the-counter canned diets, such as classic pate Fancy Feast®, have an acceptable composition of protein and carbohydrates. However, the composition of almost all dry cat diets are much too high in carbohydrates and plant-based proteins, and are too low in meat-based proteins. Therefore, any canned is better than any dry, and it’s best to feed no dry at all.

**Energy Dense, High Fat, but not TOO many calories**

About half of a canned cat food diet is animal fat. For thin cats, this energy density helps, but after the thyroid disease is cured, and the cat resumes a more normal metabolism and weight, overall calories need, yet again, to be monitored to ensure the cat doesn’t become overweight.

**Low Phosphate**

Because about 30% of the hyperthyroid cats we treat at the FHTC have some degree of renal insufficiency, a diet low in phosphorus is recommended. Restricting phosphorus in these cats can reduce PTH concentrations and improve survival time.

Ideally, cat foods should contain <250 mg Phosphate/100 kcal. Unfortunately this is only rarely accomplished in higher protein foods, and a high protein/low phosphorus food has yet to be formulated.

**What About Cats With CKD?**

If the cat is in earlier (IRIS stage 1-2) CKD we do not recommend renal failure diets.
We agree that higher protein foods are more likely to result in higher nitrogen waste product (BUN and creatinine) levels. However we do not believe that high protein in cats, or humans, accelerates the progression of the renal failure. We typically don’t protein-restrict cats until they are in later stages of renal failure, at which time sacrificing protein in order to lessen ‘unlivable’ levels of azotemia becomes the priority. This is especially important in carnivores that are recovering from a catabolic disease. Some of the increase in creatinine during recovery isn’t just ‘unmasking’ with T4 normalization, rather it is a result of rebuilt muscle, and with that the capacity to generate more creatinine again.

None of the commercial kidney diets meet our recommendations for higher protein: (> 40 % ME; > 12 g/100kcal).

Hills K/D® = 22 %, Purina NF®=27 %, Royal Canin Renal LP= 21 %  Hill’s y/d®=27 %

Therefore, feed normal canned or raw diets until the BUN > 50 and/or the creatinine > 3 mg/dl.

In cats with earlier stages of CKD, phosphorus should be restricted using methods other than changing to a low protein diet.

For example, if a cat has a serum phosphate level of ≥ 4.5 mg/dl, we advise feeding high protein foods, and starting phosphate binders to reduce the amount of phosphorus absorption. Aluminum hydroxide (100mg/kg/day), about 200 mg Q 12 hours, and can be stirred into canned, or even dry, food.

Is it safe to feed an iodine deficient diet (y/d®) to hyperthyroid cats?

In light of our increasing awareness that iodine deficiency likely plays a role in the development of hyperthyroidism in cats, how advisable is it to intentionally feed a dramatically iodine deficient diet to cats that have already developed benign tumors of their thyroid? Will ongoing, severe iodine deficiency accelerate the growth of these benign tumors? Will severe ongoing iodine deficiency accelerate the progression from benign thyroid adenoma to malignant thyroid carcinoma? Currently these questions remain to be answered. Minimally, we know that this diet does nothing to prevent the continued growth of the tumors responsible for hyperthyroidism in cats.

Hill’s y/d includes at least two of the dietary factors that appear to contribute to the development of hyperthyroidism including overt iodine deficiency and soy isoflavins that act as goitrogens.

Is it safe to feed an iodine deficient diet to cats with normal thyroid function?

Because y/d only ‘works’ if the hyperthyroid cat eats nothing else, some people feed all cats the same diet in multiple-cat households. However, feeding y/d® to every cat in a multi-cat household, just to ensure severe iodine deficiency in a single hyperthyroid cat is not only impractical, it’s unhealthful.

In addition to the issues created by feeding an iodine deficient diet, Hill’s y/d has many other features that make it a poor choice for feeding cats as a species. Cats are after all obligate carnivores and Hill’s y/d is relatively low in protein, high in carbohydrates and relies on large quantities of plant based proteins, all of which make it a poor choice to feed to any cat. The dry variety of y/d utilizes the cheap by-product filler “soybean mill run”. Soy has been shown
to contain enzyme inhibitors that impeded normal protein digestion and soy is a known goitrogen suspected as a contributing factor in the development of hyperthyroidism in cats.

Mark Peterson, DVM, ACVIM, Animal Endocrine Center, NYC:

“There is little doubt that feeding Hill’s new iodine deficient diet y/d has the potential to lower circulating thyroid hormone levels in hyperthyroid cats. The real question is whether a severely iodine deficient diet is the way to achieve “Thyroid Health” as suggested by the recent Hill’s marketing blitz. With what we know about the potential causes of hyperthyroidism in cats combined with the basic nutritional needs of the feline species it appears that a low protein, high carbohydrate, plant based, iodine deficient cat food is the epitome of what some have called “tunnel vision” nutrition”

May Dietary Measures Actually Help Prevent Hyperthyroidism?

There are numerous nutritional and environmental factors that may be involved with the pathogenesis of HT4. Thyroid disruptor chemicals or goitrogens most likely act together to affect thyroid hormone metabolism, leading to thyroid tumors and resulting hyperthyroidism. It is quite possible that avoiding certain goitrogenic ingredients or chemicals in cat foods could help prevent thyroid disease. And keep in mind, that not only the food itself, but also the food packaging and serving bowls, could a play a part.

It may be best to avoid:

Ultra-high or ultra-low IODINE diets: both excesses and deficiencies in iodine lead to thyroid disease. Fish and kelp contain a lot of iodine. Hill’s y/d® is iodine deficient.

SOY: Many food manufacturers include soy flours or “soybean mill run” to bolster protein percentage in cat foods. Plant proteins aren’t required or metabolized as efficiently as meat proteins by cats, and soy isoflavones are goitrogenic, so soy-containing cat foods should be avoided. Ironically, Hill’s y/d® dry food contains NO meat protein, and utilizes a significant amount of soybean mill run filler to satisfy it’s minimal protein criterion of 27 % ME. Y?

Can linings: almost all food cans are coated with epoxies containing bisphenol A, a known goitrogen. Some companies limit BPA, and smaller cans are less likely to be lined with BPA than are larger cans. BPA-free cans are ideal, but uncommon.

Plastic food bowls and storage containers: often contain BPA, which leaches into the food, especially if it is heated (microwaved) in the container.

Fish: fish contain higher amounts of iodine and may be contaminated with PCB’s, PBDE’s, dioxins, DDT, mercury, perfluorinated compounds, and other chemicals commonly found in our Western environments. In fact, fish tend to biomagnify (build up) chemicals.

In Summary, our answer to your client’s query:

“What’s the best diet to feed my hyperthyroid cat?”

The best diet for your hyperthyroid cat satisfies his/her nutritional requirements as an aging carnivore recovering from a muscle-wasting disease, and avoids chemicals that may contribute to thyroid disease.
It is best to feed:

Canned or raw diets, that contain little to no fruits, vegetables, or grains. Any canned cat food is better than any dry, which contains too much carbohydrate and plant-based protein. Meat by-products are fine for carnivores: they’re simply protein sources such as organ meats and entrails that people don’t find appetizing. Gravy foods tend to be high in carbs, so pates are a better choice.

Rather than focusing on particular name brands of diets, encourage people to read the food labels to see which have ingredients that meet these criteria for good cat nutrition.

Motivated clients may check out the website (www.catinfo.org), which gives nutrient breakdown of various prescription and over-the-counter diets in the link “Protein/Fat/Carbs Chart”. It turns out that many of the otc canned diets have an acceptable composition of these, and are reasonably low in phosphate, i.e.:

- >40% meat protein (>12g/100 kcal)
- <10 % carbohydrates
- 50 % fat
- <250 mg/100kcal phosphate

Note: these percentages are based on dry matter, metabolizable energy, unlike those on the can label

It may be best to avoid:

- SOY-containing foods
- BPA in canned food linings
- Fish
- Plastic food and water bowls (replace with glass, ceramic or metal)
- Storing food in plastic containers
- Ultra-high or ultra low iodine diets