Transdermal Methimazole in the Treatment of 16 Cats with Hyperthyroidism

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Abstract

The efficacy of transdermal methimazole in 16 cats with hyperthyroidism was evaluated. During the 2-year study period, 15 of the 16 treated cats exhibited a significant decrease in serum T4 value, and in 1 cat the serum T4 level increased. The mean total dose, which was administered once or twice daily, was 6.53 mg/day (range, 5 to 12.5 mg). An initial recheck of the T4 level was conducted after an average of 7.4 weeks (range, 4 to 38 wk) of treatment with transdermal methimazole. The cats that responded to therapy showed a mean reduction in the T4 level from 10.82 mg/dL (range, 4.2 to 24 mg/dL) to 2.76 mg/dL (range, 0.3 to 5.2 mg/dL). The only adverse effect of treatment (an increase in the blood urea nitrogen [BUN] level) developed in only one cat (6%) within 30 days of the initiation of therapy; that patient was scheduled to undergo reevaluation of the BUN level after 2 months. The increase in the BUN level in that cat, which was 16 years of age, was probably due to an unmasking of preexisting senile renal dysfunction rather than treatment-induced toxicity. The most common symptoms of the 16 cats studied before they underwent treatment with transdermal methimazole were weight loss, which was associated with increased appetite in some cats, and heart murmur. Other symptoms included vomiting, vocalization, and lethargy. The results of the study indicate that transdermal methimazole is effective in blocking excess thyroid hormone secretion in most cats and that it is a relatively safe antithyroid medication therapy for use in cats.

Hyperthyroidism in Cats

Hyperthyroidism is one of the most commonly recognized and diagnosed endocrine disorders of middle-aged to older cats. It produces weight loss, increased or decreased food consumption, vomiting, increased water consumption and urination, increased or decreased activity, diarrhea, weakness, labored breathing, panting, anorexia, heart murmur, or an increase in heart rate.[1] Cats that present with those clinical signs in addition to a serum T4 level of >4 mg/dL are diagnosed as being hyperthyroid.

There are three acceptable methods of treatment for hyperthyroidism in cats:[2] surgical removal of the affected glands, treatment with radioactive iodine, and treatment with antithyroid medication. Those treatments have advantages and disadvantages, and depending on the age of the cat and the presentation of the disease, one of those therapies might be more effective than another.

Surgical removal of the affected glands is curative but is associated with the risk of accidental removal of the parathyroid glands, which causes hypoparathyroidism and resulting disorders. The removal of both thyroid glands can produce permanent hypothyroidism.

Radioactive iodine administration is also curative for hyperthyroidism.[3] In cats with that disorder, radioiodine is concentrated in hyperplastic tumor cells, where it irradiates and destroys hyperfunctioning tissue. Healthy thyroid tissue and the parathyroid glands are not damaged by this treatment. Disadvantages of that treatment include the expense (approximately $1000 per cat), the possible necessity of traveling a long distance to a treatment facility, and the length of time for which the treated cat must stay at the clinic until radioactivity clears from the body (usually about 1 week).

Oral antithyroid therapy is not curative and must be continued for the remainder of the animal's life. Methimazole and propylthiouracil are used to treat feline hyperthyroidism. Of those two, methimazole is the drug of choice, because in cats propylthiouracil causes a high incidence of mild-to-severe side effects (vomiting, anorexia,

Table 1. Results of Feline Hyperthyroidism Treated with Transdermal Methimazole.

Patient Name	Patient Age (yr)	Gender	Dosage	Diagnostic T4 (µg/dL)	Duration of Treatment (wk)	T4 (µg/dL) After Treatment
Toughie	15	Male, castrated	5 mg QD	7.5	4	2.6
Knowname	15	Female, spayed	5 mg QD	4.2	5	5.2
Baby	20	Female, spayed	5 mg BID	13.8	4	0.3
Cheska	18	Female, spayed	2.5 mg BID	10.5	6	0.9
Tigger	15	Female, spayed	7.5 mg AM/5 mg PM	17.9	7	4.6
Bill	17	Male, castrated	2.5 mg BID	11.0	8	4.2
Bebe	16	Female, spayed	2.5 mg BID	8.9	9	0.9
Skippy	17	Male, castrated	2.5 mg BID	4.6	5	2.4
Franky	14	Male, castrated	7.5 mg QD	8.3	5	1.3
Bailey Frost	13	Female, spayed	5 mg BID	18.5	38	3.6
Sam	13	Male, castrated	5 mg BID	24.0	3	1.0
Rocky	_	Male, castrated	2.5 mg BID	10.0	3	3.0
Spud	_	Male, castrated	2.5 mg BID	6.2	7	3.9
Mike	_	Male, castrated	2.5 mg BID	6.8	4	3.0
Celeste	_	Female, spayed	3.5 mg BID	8.4	8	3.6
Aloura	_	Female, spayed	5 mg AM/2.5 mg PM	12.5	3	3.6

BID = Twice daily QD = Daily

lethargy, thrombocytopenia, immune-mediated hemolytic anemia, the development of serum antinuclear antibodies).[4] However, methimazole also produces side effects (anorexia, vomiting, excoriation, lethargy, hepatopathy).[5] Oral administration can be stressful, particularly to cats with thyrotoxic cardiomyopathy or hypertension. Approximately 15% of cats treated with orally administered methimazole experience significant adverse side effects.

The transdermal delivery of drugs has been described as a potentially nonstressful means of delivering systemic medication to cats.[6] Although scientific studies of transdermal veterinary drug delivery are few, many clinicians have achieved a positive therapeutic outcome by using that dosage form. Because the response to methimazole by any route of administration can be documented by a reduction in the T4 level, the efficacy of the transdermal delivery of methimazole can be easily measured by monitoring the serum thyroxine value. In this article, the results of retrospective and prospective reviews of 16 cases of feline hyperthyroidism treated with transdermal methimazole are reviewed.

Methods

Dispensing records were reviewed by our pharmacy to identify a population of hyperthyroid cats that were undergoing treatment with transdermal methimazole. A data collection form requesting the information listed below was sent to each prescriber or veterinary practice site.

- The name of the prescribing veterinarian
- The patient's name, age, gender, and weight
- The dosage
- The frequency of drug administration
- The diagnostic serum T4 level before methimazole treatment and the date of testing
- Subsequent diagnostic T4 levels and corresponding dates of testing
- Symptoms before and during treatment with transdermal methimazole

The results of that data collection are shown in Table 1.

Results

The results of this retrospective review of medical records clearly indicate that transdermal methimazole is effective in reducing the serum T4 level in hyperthyroid cats. Lack of adverse effects, an increase in owner satisfaction, and compliance with treatment make transdermal methimazole a valuable alternative to oral therapy.

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