

# URINE MARKING & AGGRESSION: IS IT BEHAVIORAL OR IS IT MEDICAL

**Contributing Author:**

Debra F. Horwitz, DVM, DACVB

**Statement of the problem:**

An older cat was presented to the veterinary behaviorist for ongoing urine marking within the home, weight loss and increased aggressive behavior toward people and other cats.

**Signalment**

The patient was an 11 year old neutered male Ragdoll/Manx mix weighing 13 lbs. at the time of behavioral consultation.

**Medical History**

The cat was obtained from a shelter in November 1995 and was approximately 8-10 weeks of age. Early medical history from owner noted past urinary blockages which have resolved with dietary intervention and are no longer an issue. For most of the past few years the patient had been overweight (16 lbs.) and fed W/D diet (Hill's Pet Food) without appreciable weight loss until recently. At the most recent wellness visit the patient weighed 14 lbs. and records show the first recorded mention of behavioral issues. The patient had become increasingly aggressive, moody and was barbering his hair and displaying peruria outside of the litter box. Dental disease was also noted and a dental cleaning recommend. Blood work, urinalysis and EKG were performed and all results were WNL. The patient was scheduled for a dental cleaning from which it recovered uneventfully. The cat was also placed in Buspirone 2.5 mg BID to attempt to control the behavioral issues mentioned above. Over the next several months the dosage was increased first to 5 mg BID then 7.5 mg BID. Six months later weight loss, aggression and urine marking were still ongoing. A referral to a veterinary behaviorist was recommended but declined at that time.

The owner then went to another veterinary hospital which was more holistically oriented. In the interim the owner had worked with a trainer and an animal communicator and utilized rescue remedy and Feliway® without any change in the behavior. Treatment with Buspirone was ongoing (5mg TID) at this time, but the behavior had not changed appreciably. The aggressive behavior had escalated with the cat screaming and attacking visitors to the home. The physical examination by the new veterinarian noted hair loss but no other significant physical findings. The veterinarian suggested blood work with a focus on thyroid testing and urinalysis. The patient was sent home with a feline anxiety and stress product. Results of laboratory testing indicated a mildly low WBC, neutropenia, and lymphopenia. Thyroid testing was not particularly diagnostic for hyperthyroidism but the veterinarian was concerned that the weight loss and behavioral changes perhaps signaled an occult hyperthyroidism. Her other diagnostic rule out was a brain lesion of some sort yet undiscovered. The client was dispensed a natural product for early hyperthyroidism (early Hyper-thyrin) to administer daily.

One month follow up showed no change in the patient's behavior the urination continues and aggression had increased. The owner requested treatment with Ovaban which the veterinarian declined to provide

and instead the pet was put on Alpha-stim therapy. At this time the owner had already scheduled an appointment with the veterinary behaviorist and agreed to utilize this therapy until that behavior appointment.

### Behavioral History

At the time of the behavioral consultation the cat was still on Buspirone 5 mg once daily Feline anxiety and stress and early hyper-thyroidism. The behavior had not appreciably changed with these interventions. It was noted that the cat has lost three pounds in the past eight months and currently eats canned Hill's W/D and Natural Balance canned and dry. Two adults and one other cat (11yr. spayed female) were shared the home with the patient. Due to his current aggressive behavior and urine spraying, the patient lived in the basement and only out in the house while on a harness and leash. The cat will also get very agitated at the sight of other cats outside the house. Evidence of over-grooming with subsequent hair loss was noted on his forelegs and side of the body.

Further questioning revealed that the aggressive behavior had actually been present for nearly a year with the patient jumping aggressively at visitors and biting the owner when she attempted to pick him up and aggression toward workmen who come to the home which had not occurred previously. The patient also stalks and attacks the other cat in the home several times a week.

The urination outside of the litter box and possible urine spraying have been present for 10 months or longer. Urine spraying has occurred all over the house including the owner's computer in her home office. The patient continues to utilize a litter box to empty his bladder and bowel. The owners are unclear if the patient is spraying or urinating but related that "They can tell when he is going to do it because he lifts and flutters his tail".

The patient has his own litter box where he spends his time and it is scooped daily but not emptied, washed and refilled.

### Physical findings and examination room behavior

The cat was active and slightly agitated throughout the consultation. He roamed the examination room and investigated everything. His physical condition was normal, although he has lost weight he was not too thin. However, it was noted that his facial features had changed and he looked "jowly" like a mature intact male cat. During the course of the consultation, the patient turned, lifted his tail and urine marked the cabinet. The urine odor was strong and had the distinct smell of an intact tom cat. The owner verified that this is how the urine has always smelled at home.

### Diagnosis

Cats with certain medical disorders may display unusual behaviors that can be misinterpreted as a primary behavioral disorder. On the contrary, cats with behavioral issues often must undergo extensive diagnostic testing to rule-out medical disorders before a definitive diagnosis of primary behavioral disorder can be established. Clinical signs such as inappropriate urination, periuria, defecation outside the litter box, eating disorders, poor grooming habits and aggression may be observed in cats with both primary behavioral disorders and primary medical conditions involving the endocrine, gastrointestinal and urinary systems. Two common endocrine disorders of senior cats could account for the symptoms noted in this patient.

Hyperthyroidism is a common feline endocrine disorder that will cause dramatic physical and behavioral change in cats. Hyperthyroidism is quite common in companion cats and may cause hyperphagia, polydipsia, polyuria and loose stools. Cats with endocrine disorders frequently manifest behavioral changes and clinical signs that can be confused with primary behavioral disorders. Cats with clinical signs including aggression, withdrawn interaction with owner, weight loss or gain, poor grooming habits and inappropriate urination should be evaluated for a variety of feline endocrine disorders.

### Diagnosis (continued)

The diagnosis is often straightforward based on clinical signs (polyphagia, PU/PD, weight and body condition loss, unkempt hair coat appearance), palpable cervical thyroid gland enlargement and an elevated serum thyroxine (T4) level. However, the diagnosis can be challenging in some cats with appropriate clinical signs, suggestive ancillary physical and laboratory abnormalities that do not have a substantial increase in their T4 value. Approximately 10% of hyperthyroid cats have normal T4 values. Other cats may have early hyperthyroidism or concurrent non-thyroidal disease. Measuring serum free T4 (fT4) can be useful in evaluating cats that are suspected to be hyperthyroid but have normal serum T4 value. Although the sensitivity of fT4 is excellent (98.5%) and fT4 values are less affected by non-thyroidal factors there is an issue with elevated fT4 values in euthyroid cats with other illnesses (i.e., CKD) causing a lower specificity (false positives). The T3 suppression test has been described in cats and can be considered in inconclusive cases. Radioactive thyroid scintigraphy can also be useful in unclear cases as it can identify foci of hyper functional thyroid tissue.

Disorders of the adrenal gland may result in alterations of stress hormones or testosterone, both of which may affect behavior. Increases in testosterone may result in intact male behaviors (urine marking, aggression, mounting) in previously neutered animals and laboratory testing for blood testosterone levels will aid in diagnosis of these disorders. Spontaneous hyperadrenocorticism (HAC) is a less common feline endocrine disorder. Iatrogenic HAC associated with chronic corticosteroid administration or exposure can also be seen in cats. Clinical signs of PU/PD, weight gain, dramatic symmetrical truncal hair loss and epithelial thinning and fragility are seen once the disease is well established. Concurrent DM is present once HAC is established. However, early in the development of HAC the signs are not as dramatic but owners may become aware of abnormal behaviors associated with elevated cortisol levels. If spontaneous HAC is suspected then appropriate testing is indicated. The low dose dexamethasone test is preferred in cats. The dexamethasone dose in cats is 10x higher than dogs as 0.1 mg/kg dexamethasone is used. Serum cortisol is evaluated at 0, 4 & 8 hours. An oral dexamethasone suppression test using home-collected urine samples for urine cortisol: creatinine determination has also been described.

Elevated sex hormones can also cause simultaneous medical and behavior signs in cats. Unknown neuter history, bilateral cryptorchid tissue or failure to remove all ovarian or testicular tissue during routine neutering can result in this development. Adrenal gland tumors producing excessive testosterone or estrogen can develop in neutered cats. The increased levels of these hormone will produce typical hormonal male or female behaviors that have been absent in these patients following neutering. Inappropriate urination, urine marking, aggressive behavior, reluctance to interact with owners, hair coat change, etc. are often reported by owners. Ingestion by licking of exogenous testosterone or estrogen agents (medically prescribed for their owners) will cause a similar increase in these hormone and the associated medical and behavioral manifestations. Diagnosis can be confirmed by measuring serum testosterone or estrogen levels. If an elevated hormone level is confirmed and there is no reported exogenous exposure then adrenal gland ultrasound is indicated to determine if a tumor is present.

Urine marking in cats is categorized as either sexual or reactional marking behavior and usually occurs with the cat lifting their tail, backing up to an object, treading with their rear feet and expelling urine backwards onto that object. Cats will mark with urine to attract mates and also urine mark in response to environmental changes and/or stress. Urine marks are often found in socially significant places such as owner possessions, laundry or in prominent locations. Cats that mark with urine on vertical surfaces usually continue to use the litter box for elimination of both urine and stool. The diagnosis should focus on the location of the urine, the size of the urine spot and possible sources of stress in the household. Although spraying is usually thought to be associated with intact animals, neutered animals will spray and cats will often mark inside the house as a territorial response to the presence of outside cats.

Previous laboratory testing and lack of response to intervention made hyperthyroidism unlikely in this patient but should be repeated. The behavior and physical changes would be consistent with additional testosterone either from a retained testicle or an adrenal tumor. If the problem was due to a retained testicle, these behaviors would have likely been noted earlier in this patient's life since he has been in the same home for his entire lifetime. Additionally the tom cat urine odor exuded by the urine sprayed the exam room, make excess testosterone a likely causative agent in the behavior changes.

Behavioral diagnosis were: urine marking secondarily to increased testosterone levels, aggression due to hormonal influences, territorial aggression and underlying anxiety.

### Treatment

After the patient was seen for the behavioral consultation, blood was drawn and sent to Michigan State University Diagnostic services. According to the results (p. 29), thyroid values were still within normal ranges but the blood testosterone was elevated for a castrated cat.

Based on the laboratory findings and the sudden behavioral changes an adrenal tumor was suspected. The patient was referred for an ultrasound which confirmed an adrenal tumor. Successful surgery for the adrenal tumor was performed.

The owner was also sent home with standard treatment recommendations for urine marking, litter box maintenance and interactions with visitors.

### Urine marking

Previous research has shown that even urine marking cats prefer larger and cleaner litter boxes. The owner was instructed to obtain a larger litter box, continue to scoop out the litter box daily, empty wash and refill it every 7-10 days.

Cats that urine mark are often agitated by outdoors cats and agonistic interactions with other cats is correlated with feline urine marking.

The patient was also weaned off the Buspirone over the course of several weeks. Not only had it not been effective in changing behavior, but if the underlying causation was endocrine, anti-anxiety medication is not warranted.


### Territorial behavior and aggression

The owner was also advised to confine the cat before company arrived with a special food treat or toy to avoid aggressive encounters.

### Follow up

Contact with the owner one week after the surgery showed some urine spraying had occurred, but at a lower frequency than before surgery. When company is present the cat is confined or out on a leash and these two things have also curtailed urine spraying. The addition of Feliway was recommended since it can be effective in diminishing urine spraying by up to 75%.

Further follow up showed a decrease in urine marking and aggression over time. However when the cat was very agitated he might urine mark. Because it has been shown that even neutered animals will mark their territory the remaining urine marking was likely due to a learned component and frustration.

		<b>DIAGNOSTIC CENTER FOR POPULATION AND ANIMAL HEALTH</b>		Phone: 517-353-1683 Fax: 517-353-5096 www.animalhealth.msu.edu	
<i>Protecting Human and Animal Health</i>					
<b>REPORT OF LABORATORY EXAMINATION</b>					
Client:			Owner:		
Animal Health&Healing (30996) 2615 South Big Bend Boulevard St. Louis, MO 63143 USA					
Rec'd Date:	8/24/2006 12:22:00 PM	Animal:	MERLIN	MRN:	
Admitted By:	Snodgrass, Dr.	Species:	Feline	Breed:	Cat Mixed Breed
Ordered By:	N/A	Age:	11 years	Gender:	Male, Castrated
Encounter:	00219740	Tag/Reg ID:			
CR#:	GL	Other ID:			
<b>Endocrinology</b>					
<b>Endocrine Results</b>					
Collected Date/Time (If Provided)	08/23/2006 12:22:00				
Procedure		Ref Range	Units		
Testosterone Baseline	3.5 H	[<= .5]	nmol/L		
Total Thyroxine (TT4)	43	[10-55]	nmol/L		
Total Triiodothyronine (TT3)	0.9	[0.6-1.4]	nmol/L		
Free Thyroxine (fT4)	13	[10-25]	pmol/L		
Free Triiodothyronine (fT3)	3.1	[1.5-6.0]	pmol/L		
Endocrinology Interpretation	See Below				
08/23/2006 12:22:00 Endocrinology Interpretation					
This concentration of testosterone is elevated for a neutered cat. Cryptorchidism remains a possibility, but I would have expected continuous male behavior from a young age. In the years that I have been here, we have seen 2 male cats with adrenocortical tumors that appear to have had testosterone as the main secretory product. In one of these cats, the male behavior and increased testosterone were alleviated with surgical removal of the tumor. In light of the testosterone result, the normal thyroid profile results do not support a differential diagnosis of hyperthyroidism.					
Kent R. Refsal, DVM PhD Professor, Endocrinology					
L = Low Result; H = High Result; @ = Critical Result; ^ = Corrected Result; * = Interpretive Data; # = Result Footnote					