


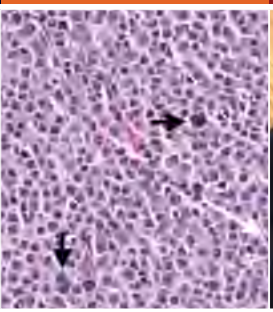



# Partners In Care

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## ANESTHESIA



### Pre-Hospital Sedation Options for Aggressive and Anxious Dogs

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**A**ggressive and/or fearful dogs present several challenges for the small animal practitioner. These patients are difficult to fully evaluate and present a safety hazard to the clinic staff, veterinarian, and sometimes even the owner. In addition, a nervous dog contributes to heightened stress within the work area affecting not only people, but other pets alike. In dogs known to be aggressive within the hospital setting or those with tremendous fear/anxiety, making physical exams and basic assessment impossible, pre-hospital sedation can dramatically improve the experience for all involved in that patient's care.

Before considering pre-hospital sedatives, it is imperative that the veterinarian as the prescriber has adequate knowledge of the dog's health status and understanding of when a medication is contraindicated.<sup>1</sup> A full physical exam should be completed before prescribing any of the recommended medications. Additionally, each go-home medication should be discussed with the owner in terms of patient risk(s) and what to expect at home. The therapies introduced in this brief article, acepromazine, gabapentin, trazodone, and melatonin, are meant to supplement **low-stress handling** (e.g., bringing overly aggressive dogs directly into an exam room

(CONTINUED ON NEXT PAGE)

## BEHAVIOR



### Building a Confident Puppy

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**N**othing makes everyone happier than having puppies in the veterinary office. The client brings the pup soon after they purchase or adopt it to make sure it is healthy, and to begin the process of vaccinations and a lifetime of health. Everyone oohs and ahs over it, but what are the most important things a vet and their staff can do to make sure the pup grows up to be happy and behaviorally healthy?

First, find out what the puppy's history is. Was it imported from a kennel or rescue group in the southern part of the U.S.? Was it from a puppy mill (often located in the central U.S.)? In either of these cases, it is likely the pup was not socialized properly to other dogs or to people. Normal canine socialization starts at age four weeks and lasts a relatively short time, until three or four months of age. During these short weeks, the pup's physiology allocates development toward their learning the social language of dogs, as well as learning that people of all shapes and sizes can be tolerated without fear, as can novel sounds and sights. Along with being undersocialized, these puppies may have been traumatized while being transported to their new home. The third part of this possible puppy triumvirate is that the puppy may have been improperly bred (e.g., its

(CONTINUED ON PAGE 10)

## ANESTHESIA

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vs. having these dogs sit in a waiting room with other stressed/vocal animals) within the clinic setting to provide a patient more amenable to handling.

**Acepromazine** is part of the phenothiazine class of sedatives and has widespread use within the veterinary world primarily during the preanesthetic period. Acepromazine elicits behavior-modifying effects primarily by drug binding and blockade of dopamine receptors in the basal ganglia and limbic system.<sup>2,3</sup> The drug exists for veterinary use in two forms—oral and injectable—and while the oral formulation has historic use in managing at-home anxieties (e.g., thunderstorms, fireworks, etc.), it can be unreliable in terms of desired sedative effect, and onset/duration are often variable. The injectable form, however, administered oral transmucosally (OTM), offers very reliable moderate to marked sedation within 20-30 minutes. With this route of administration, the dose closely follows recommended intramuscular (IM) dosing (Table 1).<sup>2,3,4</sup> In the aggressive or fearful dog, this drug is best given 30-60 minutes prior to the hospital visit (send owners home with the injectable without

needle, two doses in case one is lost during administration attempt) and instruct that effects are most profound following absorption from the oral mucosa. Contraindications are listed, but primarily include disease states that would deter one from using acepromazine in an anesthetic protocol (Table 1).

**Gabapentin** is an antiepileptic, anxiolytic, and pain management agent widely used in humans and more recently used in veterinary medicine for chronic pain therapy.<sup>1,5</sup> Exact mechanism of action of analgesia is unknown, but postulated due to interaction with voltage gated calcium channels.<sup>2,3,5</sup> In the acute setting (first one to two days of administration), sedation following gabapentin administration is often profound. This makes gabapentin an ideal agent to use alone, or often in combination with acepromazine, as part of a pre-hospital sedation protocol in the challenging dog patient. Dosing recommendations and timelines are proposed below (Table 1). Owners need to be made aware that their pet will often appear considerably more sedate at home. Supervision on stairs and getting into and out of the car should be recommended to clients with gabapentin alone

or in combination with other sedatives.

**Trazodone** is classified as a serotonin receptor antagonist and reuptake inhibitor (SARI),<sup>2,6,7</sup> used primarily in the acute hospital setting to manage anxious patients<sup>6</sup> as well as long term as a single or adjunctive agent in dogs with anxiety disorders.<sup>7</sup> While trazodone has a large safety profile, it should be used with caution in patients with known arrhythmias as serotonergic medications may increase the heart's arrhythmogenic potential.<sup>8</sup> Onset of action is approximately one hour, and the dose range can be large for this medication (Table 1), but for the purposes of pre-hospital sedation, it is recommended to start at 5 mg/kg.

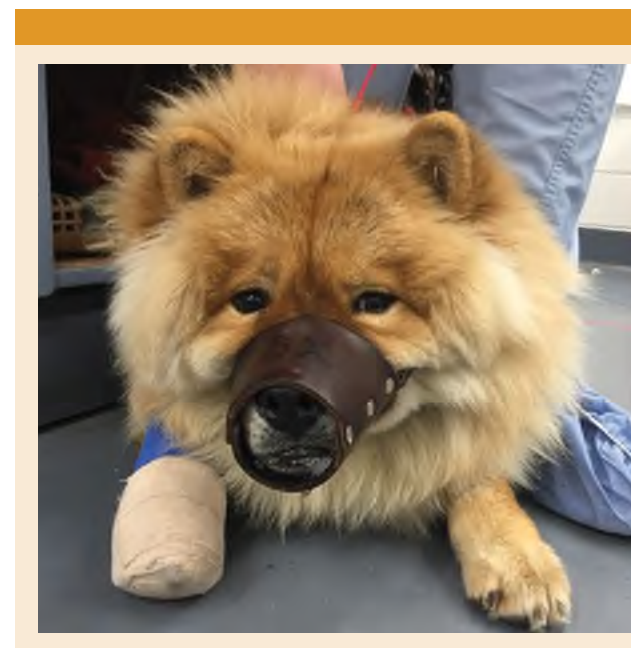
**Melatonin**, the naturally occurring hormone produced by the pineal gland, is available as a neuroceutical in dogs (lignans.net/melatonin1.html). While melatonin has proven beneficial in the management of certain endocrine disorders, it is a helpful adjunct in canine stress disorders. Therefore, melatonin is offered as an over-the-counter recommendation for the dog with hospital-associated aggression and anxiety (Table 1).

Table 1: Dosing and timeline of administration for sedative agents.

DRUG	DOSE	WHEN TO ADMINISTER*	CONTRAINDICATIONS
<b>Acepromazine</b>	Tablets: 1-2 mg/kg <b>Recommended:</b> Injectable (OTM): 0.01-0.05 mg/kg Small volumes can be diluted with 0.9% saline for easier administration	Time of onset ~20-30 minutes, so best given 30-60 minutes before hospital visit	<ul style="list-style-type: none"> <li>– Significant cardiovascular disease</li> <li>– Kidney disease</li> <li>– Liver failure</li> <li>– Trauma patients</li> <li>– Critically ill</li> <li>– Pediatrics and geriatrics</li> </ul>
<b>Gabapentin</b>	10-20 mg/kg (upper end of dose in very hard-to-handle dogs, lower end of dose in geriatric patients)	Give PO the night prior to hospital visit, then repeat same dose the morning of hospital visit (at least 2 hours prior)	<ul style="list-style-type: none"> <li>– Liver failure</li> <li>– Critically ill</li> <li>– Pediatrics</li> </ul>
<b>Melatonin</b>	By weight: <5 kg – 1 mg 5-15 kg – 1.5 mg 15-50 kg – 3 mg >50 kg – 5 mg	Morning of hospital visit, same time frame as morning gabapentin (2 hours prior to visit)	None
<b>Trazodone</b>	5 mg/kg	Give PO the night prior to hospital visit, then repeat same dose the morning of hospital visit (at least 2 hours prior)	<ul style="list-style-type: none"> <li>– Pre-existing arrhythmias</li> <li>– Patients on monoamine oxidase inhibitors (MOAIs)</li> <li>– Patients with seizure history/epilepsy<sup>9</sup></li> </ul>

\*Timing recommendations based on morning appointments. If appointment falls in afternoon or evening, morning-administered medications are likely to have little effect. Timing regimen should be adjusted based on dog's appointment time.

## ANESTHESIA



While all of these medications can be given as single agents, it is recommended to combine in a stepwise process until desired sedation is achieved. The combination of gabapentin and acepromazine is often very effective in the aggressive and/or fearful patient, allowing one to safely muzzle, place an E-collar, or administer additional IM sedation without causing large undue stress to the dog or hospital staff. If additional at-home sedation is desired, though, melatonin and then trazodone can be considered.

When sending home pre-hospital visit sedation with owners, it is important to do a trial of the sedation **before** the event so owners have an idea of what to expect. It is very common that the dog appears much more sedate at home in comparison to the clinic, and duration of sedation can be variable—up to 24 hours, which is normal and not harmful. Practice and learned comfort with oral sedation can dramatically improve the hospital experience for stressed and fearful dogs, but requires self-, client-, and staff-preparedness in mitigating additional stressors within the hospital environment. The outcome is a dog that adapts more readily to a new environment, allowing for an improved patient assessment and patient-doctor relationship.

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## Radiographic Approach to Bone Imaging

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Evaluating a limping dog or cat can be a frustrating and unfruitful exercise, for the veterinarian and client alike. Radiographs of the affected limb will almost certainly be part of the diagnostic workup at some point, and interpreting the radiographs may be similarly frustrating for the primary care veterinarian, radiologist, or surgeon. As with most medical problems, starting with a good history and thorough physical exam (in this case, an orthopedic exam) is an essential baseline. Determining whether the lameness is acute or chronic, intermittent or constant, shifting leg or not, progressive or static will help narrow the list of differentials.

The most important part of the orthopedic exam (and probably the most important part of the workup) is attempting to localize the cause of lameness to a single joint or single bone. From a radiographic perspective, the reason for this is that the diagnostic quality/yield of your images will be much greater if you are tightly collimated to the area of interest (Figure 1).

Reducing field of view will reduce x-ray scatter, thereby reducing noise and blurriness. Additionally, focusing on one joint will make it easier to position the patient for straight craniocaudal and lateral views. Significant lesions are frequently missed due to slightly oblique positioning (Figure 2).

FIGURE 1

Collimating your x-ray exposure tightly to the area of interest will greatly improve the quality of your radiograph. On the right, attempting to capture both limbs and using very wide collimation results in a poor-quality radiograph. On the left, same cat in same position, but with collimation tight over the right carpus.



FIGURE 2

Slight differences in obliquity result in dramatic differences in visibility of lesions. On the left, somewhat obliqued craniocaudal view of an elbow. On the right, straight craniocaudal view of the same elbow, showing fairly severe flexor enthesopathy and medial coronoid fragmentation.



FIGURE 3

On the left, carpus of a four-month-old kitten with swelling and lameness. Medial carpal bones appear slightly irregular, but it is not clear whether this is normal incomplete ossification in this young patient (white arrow). Radiograph of the opposite limb confirms that the affected limb is abnormal (osteomyelitis).



FIGURE 4

Well-defined or uninterrupted periosteal reactions. A smooth periosteal reaction on the proximal fibula secondary to surgical stimulation. An irregular periosteal reaction along the caudal margin of the tibia in a healing TPO. Spiculated periarticular new bone formation in a stifle with chronic degenerative joint disease.



FIGURE 5

Ill-defined or interrupted periosteal reactions. Lamellar reaction along the medial aspect of the proximal femur, characterized by linear mineralization parallel to the periosteum. Palisading (or columnar) reaction along the distal femur, characterized by linear mineralization perpendicular to the periosteum. Amorphous periosteal reaction associated with a highly aggressive proximal humerus lesion. All lesions were osteosarcoma.



As with most radiographic interpretation exercises, recognizing what is normal bone and joint anatomy is a prerequisite for determining what is abnormal. A good radiographic atlas is essential for helping to determine whether a bone or joint is normal. The atlas I use most, and the textbook I most commonly consult on a regular basis, is *An Atlas of Interpretative Radiographic Anatomy of the Dog and Cat* by Arlene Coulson and Noreen Lewis (Wiley-Blackwell). This atlas includes normal radiographic dog and cat anatomy for adult animals, juveniles at various stages of development, as well as some conformational variants such as chondrodystrophics and brachycephalics. Sometimes if it is unclear whether a particular joint/structure is normal for an individual patient, it can be very useful to obtain a comparison radiograph of the contralateral limb (Figure 3).

Once you have your well-positioned, well-collimated radiographs centered on the painful joint or bone, the most important question (besides whether an abnormality is present or not), is whether you have an aggressive or nonaggressive lesion. Although many tend to equate an aggressive bone lesion with cancer, technically an aggressive lesion is defined as any process that if left unchecked would progress to complete destruction of bone. In addition to cancer, infection (bacterial or fungal osteomyelitis) and autoimmune disorders (rheumatoid arthritis) can lead to aggressive

bone lesions. There are many classic radiographic criteria used to determine presence and severity of an aggressive bone lesion, but typically the two we focus on are presence/pattern of osteolysis and the presence of an ill-defined periosteal reaction.

There are three classic patterns of osteolysis: geographic, moth-eaten, and permeative. Generally speaking, the presence of lysis is almost always associated with an aggressive lesion, and the differentiation between the patterns is somewhat academic. The exception is that some benign lesions such as bone cysts may cause focal geographic lysis, which is defined as an area of very well-delineated bone loss, frequently circular or ovoid in contour. Other than these rare exceptions, it is mostly just critical to identify the presence of bone loss, regardless of pattern.

Periosteal reactions are a bit trickier. Generally speaking, a periosteal reaction is defined as an area of new bone formation occurring along the surface of the bone. This is a response of the periosteum surrounding the bone, which tends to lay down new bone as a result of any form of stimulus or injury. With nonaggressive lesions, typically the growth of the lesion is quite slow, and the periosteum is able to lay down new bone in a fairly consistent and organized fashion, leading to a well-defined or uninterrupted pattern (Figure 4). With aggressive lesions, the growth rate exceeds the periosteal capacity to

produce new bone, and the result is an ill-defined or interrupted pattern (Figure 5). One way to help determine whether a periosteal reaction is interrupted or uninterrupted is to imagine using a pencil to trace the contour of the periosteal reaction. If it is possible to trace the entire border of the periosteal reaction without lifting the pencil tip off the radiograph, that is an uninterrupted periosteal reaction.

Once you have determined whether an aggressive or nonaggressive bone lesion is present, the differential diagnoses and subsequent case workup should become fairly clear. With an aggressive bone lesion, bone biopsy is typically the next step to assess for malignancy. If there is potential exposure to fungal disease, or if there is the potential for bacterial infection (trauma, previous surgery in the affected area), obtaining bacterial cultures and fungal titers would also be prudent. With nonaggressive lesions, the differentials are most likely going to be related to developmental diseases in young animals and degenerative joint disease in older animals. A thorough discussion of these various orthopedic issues is beyond the scope of this article.

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## Tumor Grading—Is It Applicable?

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In New England, where systemic fungal disease and other infectious lesions do not frequently cross the microscope stage, neoplastic conditions account for the majority of submissions. As with any pathologic process, the pathologist's primary goal is to achieve a definitive diagnosis. In addition—particularly in the case of malignant neoplasia—the pathologist seeks to assess the extent of disease and provide a tumor grade in order to guide future treatment and offer prognostic information. Evaluation of inked surgical margins is a sometimes frustrating task fraught with various challenges, including tissue shrinkage and folding during processing, blurring or dilution of inked margins, and sliding of fascial planes, to name a few. Tumor grading can be more objective, but depends on having established criteria for specific types of cancer. This article highlights what I consider appropriate application of grading schemes, including examples of grading systems I currently use for biopsy cases submitted to Angell.

**The purpose of a histologic tumor grade is to predict biological behavior.** In general, tumors categorized as “low-grade” or “grade I” are associated with a lower risk of recurrence, invasion, metastasis, and/or have a longer survival, while “high-grade” tumors have a greater risk of progression and/or death. A histologic grade should only be applied if objective, evidence-based criteria have been published for the affected species, tumor type, and lesion location, AND if the established criteria have been correlated with behavior. For example, a retrospective study evaluated histologic features (degree of differentiation and mitotic index) of digital squamous cell carcinomas relative to clinical outcome, and showed that histologic grade does not predict behavior, including new tumor development or metastasis.<sup>1</sup> Thus, even though a tumor type might seem amenable to receiving a histologic grade (i.e., a well-differentiated squamous cell carcinoma with rare mitoses MUST be low-grade, right?), **the application of such a grade is meaningless—or worse, inaccurate!—in the absence of studies correlating grade with prognosis.** There are a few common grading

systems that I routinely apply to diagnostic cases, which I will summarize in the upcoming section. I encourage clinicians to alert pathologists to new publications on histologic grades, as articles may be published in a diverse array of journals not limited to pathology- or oncology-specific themes.

### CANINE CUTANEOUS MAST CELL TUMORS

I began applying the new two-tier grading system proposed by Kiupel et al. in 2011.<sup>3</sup> In this system, the criteria evaluated by the pathologist are relatively objective, including a count of mitotic figures, multinucleated cells, cells with bizarre nuclei, and karyomegaly. If any one of these criteria surpasses the established cutoff value, the mast cell tumor is classified as high-grade. The study evaluated canine mast cell tumors of the skin; therefore, the criteria should not be applied to mucosal, visceral, or entirely subcutaneous/deeper soft tissue mast cell tumors (which were not evaluated in the study).

I find the emphasis on objective/quantifiable features to be a strength of the new two-tier mast cell tumor grading system compared to the three-tier grading scheme published in 1984 by Patnaik et al.<sup>7</sup> Criteria in the Patnaik system are established per grade. For example, a grade I mast cell tumor is confined to the dermis AND composed of round monomorphic cells AND includes medium-sized cytoplasmic granules AND lacks mitoses AND has minimal edema/necrosis.<sup>7</sup> Since a grade II has its own combination of characteristics, how should a pathologist interpret a mass that has some features of each grade? When mast cells extend slightly into the superficial subcutis, I will diagnose a mast cell tumor as grade II, despite other features such as cell morphology and mitotic count best fitting a grade I diagnosis. Another pathologist may determine that the depth of extension is insufficient to warrant the increase in grade, as all other features fit the grade I classification. This lends a level of interpretation to the grading scheme, which in turn increases the interobserver variation particularly in diagnosing grade I vs. grade II mast cell tumors with Patnaik criteria. Two goals of the newer two-tier system are to

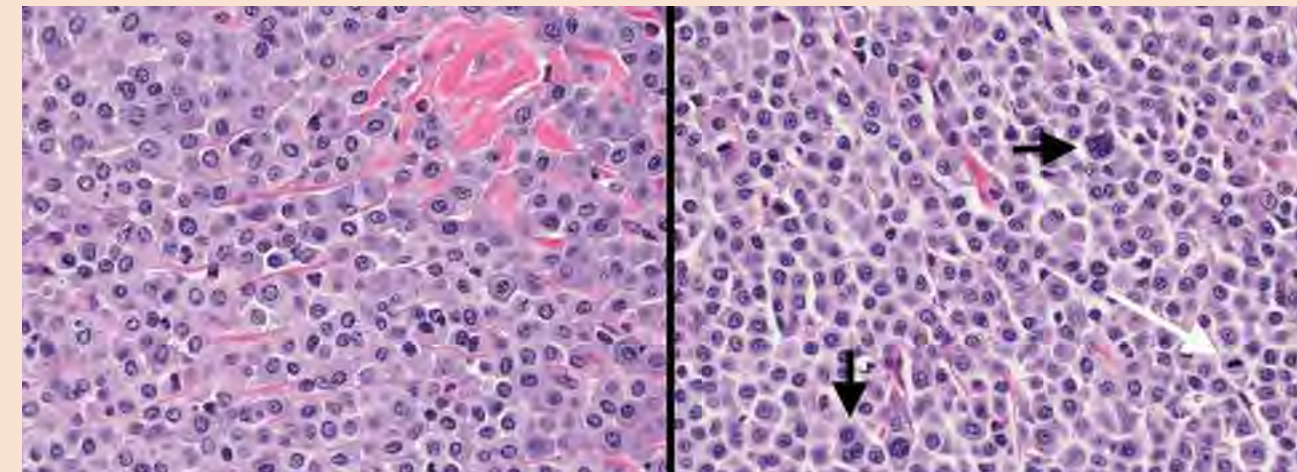
decrease interobserver variation of mast cell tumor grading and to more consistently predict highly aggressive mast cell tumors.<sup>3</sup> In the 2011 study, a group of 28 veterinary pathologists evaluated mast cell tumors using Patnaik criteria, and the agreement among pathologists for diagnoses of Patnaik grades I and II was low, likely related to the reasons I have described above.<sup>3</sup> Differentiating mast cell tumors as grade I vs. grade II using the Patnaik system was also determined not to be prognostically significant.<sup>3</sup> Thus, one might argue that the new system simply lumps the two lowest Patnaik grades (I and II) into a single low-grade classification. While this seems true for a large proportion of cases, occasional tumors that would be categorized as grade II with the Patnaik system are actually classified as high-grade in the two-tier scheme based on the additional morphologic features other than mitotic index (such as multinucleation, karyomegaly, etc.). I would estimate that 90 percent of the cutaneous mast cell tumors I diagnose are classified as low-grade, with the remaining ~10 percent categorized as high-grade. Figure 1, compares a low- vs. high-grade cutaneous mast cell tumor using the 2011 grading criteria.

### CANINE SOFT TISSUE SARCOMAS

To my knowledge, the most common grading scheme applied to canine soft tissue sarcomas (STSs) is based on a retrospective study published in 1997.<sup>4</sup> The system assigns a score for each of three variables, which are: 1) the degree of differentiation, 2) mitoses per 10 high power fields, and 3) proportion of necrosis in the examined area of tumor. Each variable receives a score from 1 to 3, and the sum of the three scores (anywhere from 3 to 9) determines the overall grade, which ranges from grade I (low) to grade III (high). Interestingly, a grading scheme outlining the same variables and scoring system had been published in 1984 for human STSs and presumably provided the basis for the 1997 veterinary publication.<sup>8</sup> An important distinction between the two articles is that the total score could result in differing grades based on the published cutoffs. For example, a total score of 4 is considered a grade

FIGURE 1

High-magnification photomicrograph depicting a low-grade cutaneous mast cell tumor on the left and a high-grade on the right. Note the uniform appearance of mast cells in the left-hand panel, as compared to the variability apparent on the right. The vertical and horizontal black arrows depict multinucleated and karyomegalic cells, respectively, while the white arrow illustrates a mitotic figure. HE stain, 25 um magnification bar.



I by the 1997 veterinary system but would be a grade II based on the 1984 publication for human tumors.<sup>4,8</sup> Soft tissue sarcoma grading based on these published criteria is limited to dogs with cutaneous/subcutaneous masses and does not include tumors of the brachial plexus or oral/maxillary fibrosarcomas.

Some potential weaknesses of the STS grading systems above include “lumping” multiple histologic tumor types into a single group, using a subjective variable (degree of differentiation) as a scored component, and applying a score to necrosis. Tumor types included in the soft tissue sarcoma category include fibrosarcoma, peripheral nerve sheath tumor, myxosarcoma, liposarcoma, perivascular wall tumor (including hemangiopericytoma), pleomorphic sarcoma, malignant mesenchymoma, and undifferentiated sarcoma.<sup>2</sup> Excluded from the STS group are histiocytic sarcoma, hemangiosarcoma, synovial cell sarcoma, leiomyosarcoma, and rhabdomyosarcoma. Some of these entities, such as perivascular wall tumors and peripheral nerve sheath tumors, may be difficult to distinguish histologically. Immunohistochemistry may assist in further phenotyping sarcomas but is often not pursued due to client cost and availability. Therefore, a system of “lumping” is more realistic in classifying and grading canine STSs even if there may actually be behavioral differences among the various sarcoma types. Degree of differentiation is the most subjective and therefore the least reproducible variable of the STS grading system,<sup>2</sup> which may lead to interobserver variation in histologic grading. I

consider necrosis to be a secondary effect of the tumor, and not an inherent characteristic of the neoplasm itself. While necrosis may be more common in rapidly growing lesions that become hypoxic, external factors (such as self-trauma) may also induce tumor necrosis and cause an artificial increase in overall grade.

### CANINE AND FELINE MAMMARY CARCINOMA

Numerous published studies evaluate mammary carcinomas in domestic animals, as both dogs and cats have been proposed as animal models of the widely researched human disease. In a veterinary pathology textbook detailing neoplastic diseases of domestic animals, Misdorp outlines a three-tier grading scheme for mammary carcinomas in both species, which basically compiles multiple published findings.<sup>6</sup> Each of three variables—level of tubule formation, mitoses/hyperchromatism, and nuclear pleomorphism—is scored from 1 to 3, and the sum of the scores determines histologic grade. In 2015, a novel grading scheme was proposed for cats that included lymphatic invasion, nuclear atypia, and mitoses.<sup>5</sup> These variables were derived (and simplified) from a human breast cancer grading scheme published in 1991, and the three resultant grades show significant differences in survival. While this grading scheme is relatively new and based on a retrospective study, I appreciate the species-specific approach and the intent to make the grading criteria simple and objective for diagnostic purposes. I have begun providing both grades for feline mammary carcinomas as

the two systems may differ. I am hopeful that follow-up studies will strengthen this proposed grading scheme.

### FINAL DISCUSSION

There are several other grading systems for various canine and feline tumors that I have not described here and am unlikely to apply routinely to diagnostic cases. Advanced techniques, such as immunohistochemistry, proliferation markers, and prognostication panels, are supplemental tools that may eventually negate some of the older grading schemes that are based solely on histopathology. Currently, these ancillary tests are used in a supplementary fashion. For example, immunohistochemistry may be employed to further classify soft tissue sarcomas while the mast cell tumor prognostication panel provides additional prognostic data for canine cutaneous mast cell tumors.

### SUMMARY

It is important to reiterate that **histologic grades are employed to PREDICT biological behavior**, not to definitively proclaim the future. This has likely been experienced firsthand by those veterinarians reading this article who have treated dogs with “alleged” low-grade cutaneous mast cell tumors that have widely disseminated, or dogs with incompletely excised high-grade soft tissue sarcomas that persist for many years without tumor recurrence. Tumor grading is certainly not a perfect science, which makes it

*Continued on page 13*



## Eyelid Margin Masses in Dogs: To Cut or Not to Cut?

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The most common type of elective surgery we perform at Angell Ophthalmology is removal of small eyelid tumors via V-plasty. Eyelid tumors can occur in any breed at any age, but older dogs tend to present to our service for evaluation. The most common types of tumors appear as neoplasia of the meibomian glands, the primary oil-producing glands located in the eyelid margin. There are dozens of these glands in each eyelid, and the origin of these tumors is usually either the duct linings (epithelioma) or the ascini (adenoma) that grow as multilobulated pink to gray well vascularized (Figure 1). Less common benign tumors that have been reported with any significant frequency include papillomas and melanocytomas. Fortunately, for most dogs, the vast majority of eyelid margin tumors are benign, so there is little risk for metastases, and surgery is usually curative. If left alone, however, the lesions have the potential to be locally aggressive and disfiguring, leading to ocular surface irritation or, worse, corneal ulceration or infection. Depending on the size of the tumor, there are options for surgical resection, especially if the mass is progressing in size or associated with ocular surface disease.

FIGURE 1

▶ Eyelid meibomian adenoma amenable to V-plasty correction.



Determining when the eyelid surgery is indicated depends on location, size, and rate of growth. If the rate of growth is slow and there is minimal, if any, redness or discharge, periodic observation may be sufficient for monitoring change, including progressive ocular surface irritation, especially if the patient is deemed high anesthetic risk. If the eyelid tumor is smaller than 2-3 mm, then observation is indicated; however, we often will advocate for early tumor removal if possible to reduce morbidity and preserve as much of the normal eyelid margin as possible. For small tumors, cryosurgery can be very effective. It is a sutureless procedure that requires a brief general anesthesia. Typically the tumor is trimmed to the eyelid margin surface (submitted to pathology in most cases), and the affected eyelid is treated with two rounds of freezing with a cryoprobe, about 20 seconds each treatment. Protecting the skin and globe is essential anytime there is eyelid cryosurgery. Towels and a corneal shield are used for this purpose. A chalazion clamp is very helpful to immobilize the eyelid during cryosurgery and will help expose the conjunctival surface of the eyelid margin where the cryoprobe is applied just below the eyelid margin for 20 seconds (from visible ice formation in the eyelid) (Figure 2). Depigmentation (sometimes permanent), transient blepharitis, blepharidema, and skin ulceration is expected with cryosurgery and can last up to seven to ten days peaking about three to five days post surgery on average. Some local skin ulceration may also occur and resolves in the first one to two weeks. The goal of care is to destroy any residual tumor cells and allow the eyelid to heal without any incisions or suture placement. Infection is rare, but topical antibiotics and systemic anti-inflammatories and pain medication are typically used postoperatively. CO2 laser has also been used for small eyelid tumors.

While cryosurgery is generally done by a veterinary ophthalmologist, surgical resection for margin tumors is not uncommonly done by ophthalmologists and general practitioners alike. For tumors up to 8-9 mm in diameter, eyelid V-plasty under brief general anesthesia

FIGURE 2

▶ Cryosurgery for small eyelid margin tumor.



FIGURE 3

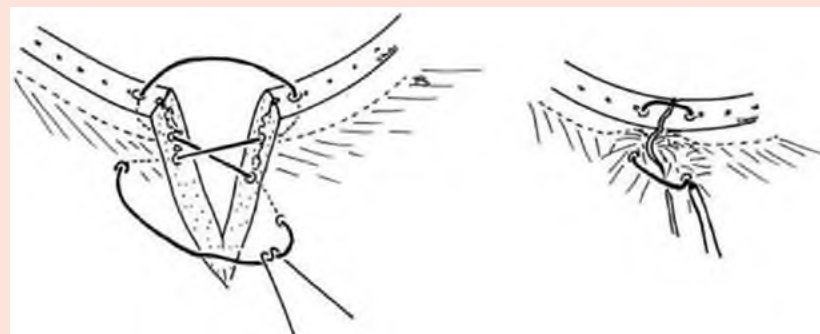
▶ Small eyelid margin tumor with deeper chalazion (to the left of the margin tumor) seen on conjunctival surface.



can be a successful way to resolve larger eyelid tumors with or without chalazion formation. Chalazions are ruptured meibomian glands that cause local inflammation in the region of the primary tumor (Figure 3).

FIGURE 4

▶ Figure eight suture pattern for closure of the V-plasty.



**Lipogranulomatous blepharitis** (a.k.a. chalazion) is frequently an accompanying diagnosis for many of our eyelid margin tumor biopsies. Simple V-plasty requires sharp resection of the mass with a size 15 surgical blade while the eyelid is immobilized with a chalazion clamp (usually the open side to the conjunctival surface, but this can vary depending on the orientation of the tumor). Closure is accomplished with a soft braided suture such as 4-0 silk (nonabsorbable) or 4-0 vicryl (absorbable) depending on the surgeon's preference. To reconstruct a fluid eyelid margin and preserve good eyelid conformation, a figure eight pattern is recommended followed by simple interrupted or cruciate patterns to close the remaining surgical incision (Figure 4).

For dogs and cats, a single-layer closure is usually sufficient. If more suture support is needed, a deeper layer of 5-0 or 6-0 vicryl can be placed prior to the skin sutures to bring the surgical incision together and provide added strength. Simple continuous or simple interrupted patterns are commonly used, but care must be taken to avoid suture exposure on the conjunctival surface. Complications from V-plasty can be minor or severe and may include corneal ulceration, infection, suture reaction, eyelid margin misalignment, or eyelid tumor regrowth if tumor cells are left behind.

**When an eyelid tumor is suspected to be malignant:** Types of more malignant tumors on the eyelid include squamous cell carcinoma, melanoma, sarcoma, and mast cell tumors. These tumors need a more careful workup often including a confirmatory biopsy or aspirate prior to definitive resection, since surgical margin size and careful eyelid margin reconstruction are integral parts of the procedure to preserve vision and comfort. Systemic bloodwork, lymph node examination, and chest x-rays are also important prior to any elective surgery for possible

metastatic or malignant cancer. There are surgical options for malignant tumors and benign tumors larger than 10 mm that offer more suitable reconstruction than V-plasty can provide. These options include rotating skin grafts, H-plasty, and Z-plasty, most frequently performed by ophthalmologists or surgeons.

FIGURE 5

▶ Inflammatory eyelid lesion (mixed inflammation on cytology) in a Boston terrier. The lesion resolved with topical anti-inflammatories.



**When there is concurrent ocular surface disease or suspected swelling from noncancerous focal blepharitis:** Patients with allergies or concurrent dry eye deserve extra attention to perioperative corneal health as eyelid irritation can exacerbate a sensitive ocular surface. In these higher risk patients, utmost attention to suture placement and generous use of postoperative medicated lubricants and medication to support tear production should be used without interruption. In general, four to six times daily for topical

antibiotics including neopolybac or erythromycin are used for uncomplicated eyelid tumors where the ocular surface is stable. Pain management with a short course of oral NSAID is also indicated as is use of an E-collar for up to two weeks. Some eyelid lesions are also inflammatory and do not need surgery for resolution (Figure 5).

Topical neopolydex applied directly on the lesion two or three times daily for up to 10-14 days usually provides adequate treatment for these conditions. However, some more persistent lesions require more frequent application of the anti-inflammatory or oral steroids and antibiotics in select cases (e.g., staph blepharitis). FNA cytology of the lesions can direct the therapy in more stubborn swellings and can also disclose more sinister conditions including mast cell tumors. Histiocytomas have also been reported near the eyelid margin and often resolve on their own with time and supportive care. Styes are less frequent and are simply a chalazion with a bacterial infection. Treatment can be from lancing and local +/- systemic antibacterials in addition to local anti-inflammatories (e.g., neopolydex).

In summary, many bona fide eyelid masses can be successfully treated with simple surgery. Their appearance is typically spontaneous and unpredictable, but more common in older patients. Considerable care to preserve the eyelid margin continuity will greatly reduce the risk for ocular surface complications in the short and long term, and is essential for eyelid function. All eyelid tumors can be addressed with the help of veterinary ophthalmologists, although some smaller tumors can be handled in the care of the primary veterinarian comfortable in eyelid margin surgery.

For more information about Angell's Ophthalmology Service, please visit [angell.org/eyes](http://angell.org/eyes). Dr. Biros can be reached for consults or referrals at 617-541-5095 or [ophthalmology@angell.org](mailto:ophthalmology@angell.org).

### REFERENCES

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relatives did not have confident, nonfearful/aggressive temperaments). A puppy bred by a reputable breeder may or may not escape undersocialization as the breeder attempts to keep the puppy from being exposed to disease, and a perfect topline, bite, or history of breed championships may trump breeding for temperament.

If undersocialization is the case with the puppy, it is imperative that the puppy is exposed, gently, to a multitude of other dogs and people before it is four months old. If the pup has to wait until it is 16 weeks old and has had all its vaccinations, it is at risk of growing up to be fearful of novel sounds and people, and unable to communicate normally with other dogs. Sadly, this is a permanent condition. In much the same way that a human child will never be able to learn language if they are not spoken or signed to by the time they are about four years old, a puppy that has been undersocialized at this early age is always at risk of being fearful and may struggle with normal socialization with other dogs and people. The American Veterinary Society of Animal Behaviorists' position statement advocates early socialization, saying that undersocialized dogs are at greater risk of death from euthanasia for behavioral reasons than they are from dying from disease caught by lack of vaccination. It is, therefore, a valuable service you are providing to your clients to read the literature on puppy

socialization and to help your clients make the best decision for socializing their puppy.

How to best socialize the puppy? Ideally, socialization should not consist of simply exposing the pup to every person, place, dog, or thing. Instead, puppies should be exposed to novel stimuli at a distance at which the pup can cope with the newness, and an escape option should be in place should the puppy get frightened. Thus, if a neighbor is a tall and robust dog lover, and this huge person leans right over the puppy, causing it to back up, urinate a bit, even growl, make sure the pup can escape, and the owner should say, "Give the pup some space, he/she is scared, thanks." The same is true with dog socialization: the pup should be exposed to puppies of a similar size and/or play style; for example, a 10-week-old Parson Russell terrier could be a good match for an adult border collie, and too much for a timid 10-week-old Goldendoodle. If the owner is going to take their pup to a socialization class, they should make sure that:

1. There is at least one staff person to every three dogs, and rewards-based training only is used;
2. There are adult dogs in the class who can gently teach dog socialization skills to the puppies;
3. The puppies will be matched for the best play outcome, as per above—size and style of play, rather than breed alone, and reciprocal play is shaped during the class. This means pups take turns chasing each other and being on top (or bottom) during a wrestling match, and no puppies are allowed to bully other puppies;
4. Puppies are allowed to escape to a "safe place" during class should they feel the need.

If the puppy owner is going to socialize a puppy at a dog park, the above items 2-4 should be adapted: make sure owners are attending to their dogs; that adult dogs are tolerating the puppy; that turn-taking is evident during play; and that puppies can get away from other dogs easily. For most puppies, a prearranged meet-up with known dogs at a dog park will be much safer and productive than tossing the puppy into a typical dog park free-for-all.

In the home, the puppy should have a variety of toys, and the owner should rotate them so they retain the puppy's interest. Crate-training is recommended. It can be accomplished by feeding the pup in its crate, leaving treats and toys in there for the puppy to find, and leaving the puppy in there a few minutes at a time,

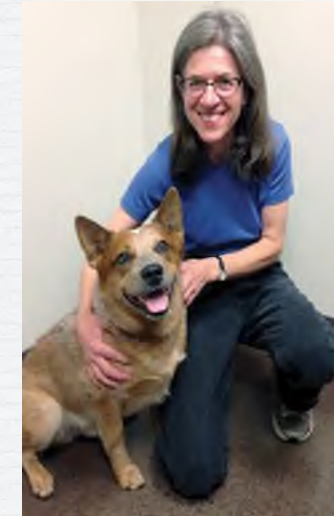
gradually building up to longer stays. The crate will also help to housetrain the puppy, as the owner can take the pup outside as soon as it comes out of the crate and reward it for going in a designated spot outside. The puppy can be taught to ring a bell that hangs at its nose level on the door it goes out, so it can tell the owner when it needs to go out. Until the puppy can 1) recognize it's better to eliminate outdoors and 2) let the owner know they need to go out, it should be crated or under the owner's direct supervision at all times. When the puppy goes from playing or being calm to putting its nose on the floor, it should be hustled outdoors to go to the bathroom. If the puppy has an accident, the puppy should not be punished or scolded, or it could start to hide where it goes indoors.

Lastly, the puppy's first veterinary visits will leave a lasting impression, so go slowly with the puppy, pairing fear-provoking stimuli such as stethoscopes and syringes with tasty treats. Sit on the floor with the pup, rather than leaning over him. Have a few squeaky toys on hand to interest the puppy. If the pup moves away or growls, give him or her a break. Do not scold or punish them, as they are just telling you they are frightened. Sophia Yin's books and videos give lots of helpful how-tos in this regard.

By following these guidelines, a puppy's community can help it grow into a well-adjusted dog that plays well with others and is a behaviorally healthy family member.

For more information, please contact Angell's Behavior Service at 617-989-1520 or [behavior@angell.org](mailto:behavior@angell.org).

## ➤ SPOTLIGHT: ELLEN M. LINDELL, VMD, DACVB



We are pleased to welcome Ellen Lindell, VMD, DACVB, to the Behavior department at Angell Boston. She sees patients on Mondays and Tuesdays at Angell Boston and joins Terri Bright, Ph.D., BCBA-D, CAAB, and Jocelyn Strassel, M.S., CVT.

Dr. Lindell earned her veterinary degree from the University of Pennsylvania School of Veterinary Medicine. She practiced general medicine and surgery for 10 years and then completed a residency in Behavior at Cornell University College of Veterinary Medicine.

Dr. Lindell is a diplomate of the American College of Veterinary Behaviorists (ACVB) and is currently president-elect of the ACVB. She founded a private behavior specialty practice, Veterinary Behavior Consultations, PC, and has treated behavior patients in New York and Connecticut for over 20 years. She also serves as a behavior consultant to other veterinarians on VIN (Veterinary Information Network).

One of Dr. Lindell's passions is to facilitate good veterinary care for all patients by reducing the distress that can be associated with veterinary visits. Pets and their families often experience anxiety when they arrive at the veterinary hospital. Dr. Lindell is an active member of the Fear Free<sup>SM</sup> Advisory Panel, a team of animal-care experts working together to understand and prevent fear related to veterinary care. Dr. Lindell is also proud to be a Certified Fear Free<sup>SM</sup> Professional and a Fully Approved Fear Free<sup>SM</sup> Speaker. She continues to support and guide veterinary teams as they create a Fear Free culture in their practices.

Dr. Lindell enjoys teaching and has lectured extensively to veterinarians and veterinary technicians as well as to members of clubs and organizations with an interest in animal behavior. She has contributed to several textbooks including the 5-Minute Veterinary Consult, and the BSAVA Manual of Canine and Feline Behavior. Dr. Lindell also contributed to a chapter in the popular publication *Decoding Your Dog*.




In her spare time, Dr. Lindell treats her own dogs to some fun training. Several of her dogs have earned conformation, obedience, and agility titles. When the pets have turned in for the evening, Dr. Lindell ends her day by playing classical piano.

### BEHAVIOR APPOINTMENTS

- Monday appointments (1 hour): 12pm, 2pm, 5pm, 7pm
- Tuesday appointments (1 hour): 7:30am, 9:30am
- Wednesday appointments (1 hour): 1pm, 2:30pm, 4pm, 5:30pm
- Thursday appointments (1 hour): 2:30pm, 4pm, 5:30pm
- Friday appointment (1 hour): 11am
- Waltham by appointment
- MSPCA-Angell at Nevins Farm (in Methuen) by appointment

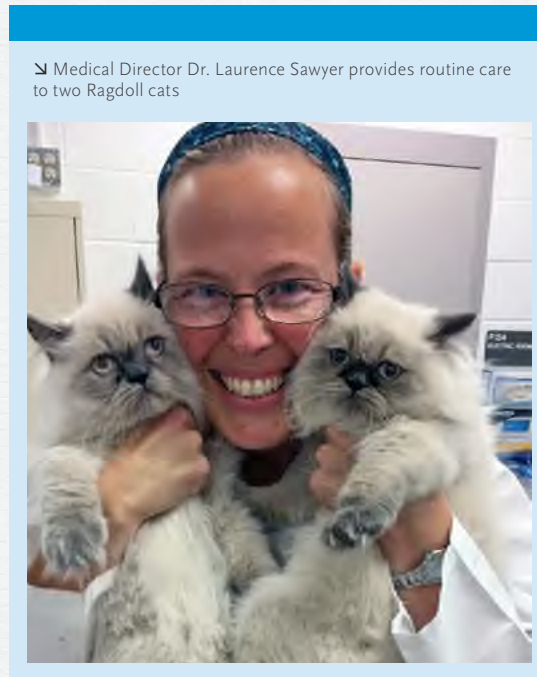
## ↘ ANGELL AT NASHOBA: LOW COST CARE FOR FINANCIALLY QUALIFIED CLIENTS

Angell Animal Medical Center and Nashoba Valley Technical High School have partnered to create **Angell at Nashoba**, a veterinary clinic for low income pet owners that also serves as a rigorous academic and experiential training program for students enrolled at Nashoba Valley Technical High School. Opened on February 3, 2016, the clinic provides discounted:

-  SPAY/NEUTER SERVICES
-  VACCINATIONS
-  BASIC VETERINARY CARE





Open weekdays from 7:45am-4:00pm throughout the year, the clinic does not provide overnight care, specialty service care, nor 24/7 emergency service as Angell's Boston and Waltham facilities do, but will refer cases as appropriate to surrounding specialty veterinary referral hospitals.

To reach the clinic, please call **978-577-5992**. The clinic is located at: 100 Littleton Road, Westford, Massachusetts. For more information, visit [www.angell.org/nashoba](http://www.angell.org/nashoba).



### Financial Qualifications for Clients

To qualify for Angell at Nashoba services, clients must present a photo ID and one of the following:

-  WOMEN, INFANTS, AND CHILDREN (WIC) PROGRAM CARD
-  SPAY AND NEUTER ASSISTANCE PROGRAM CERTIFICATE
-  SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP) CARD (FORMERLY KNOWN AS FOOD STAMPS/EBT CARD)
-  LETTER/LEASE FROM THE OWNER'S LOCAL HOUSING AUTHORITY SHOWING THAT THE OWNER IS A PARTICIPANT IN PUBLIC HOUSING IN THE FOLLOWING COMMUNITIES: LOWELL, CHELMSFORD, LITTLETON, GROTON, SHIRLEY, AYER, TOWNSEND, PEPPERELL, WESTFORD

The person whose name is on the card or documents must be present (i.e., they can't send a relative or friend). The only exception is a spouse with the same last name and address.

## ↘ Q&A WITH LISA MOSES, VMD, DACVIM, CVMA Angell's Pain Medicine Service



### YOUR PRACTICE IS CALLED THE "PAIN MEDICINE SERVICE"? WHAT DOES THAT EXACTLY MEAN AND WHAT SERVICES ARE OFFERED?

Angell's Pain Medicine service consists of an outpatient chronic pain and palliative medicine clinic and a consultation service for hospitalized patients. The overall goal of the practice is simply to reduce pain and suffering in my patients. More than half of the patients are referred by other veterinary hospitals. We see all species of companion animals and I am happy to consult on large animal cases as well. There are several reasons it's called "pain medicine" and not "pain management." First off, I'm an internist who has spent over a dozen years as part of Angell's Emergency/Critical Care service, so my orientation is toward diagnosis and management of animals with complex medical conditions. Most of my patients have significant co-morbidities and see multiple specialists. Many are close to the end of their lives and they - and their owners - need help managing all facets of their care. This often includes side effects from the treatments they are receiving, in addition to more run-of-the-mill treatment for musculoskeletal pain and mobility impairment. I realized as soon as the service was opened that my experience with diagnosis and treatment of all kinds of chronic illnesses was vital to the care of my patients. In order to fully assess my "whole" patient I need to understand the pathophysiology of those illnesses and how medications interact. In addition to diagnosis and assessment of painful medical problems, I work closely with pet owners who need help making decisions about medical care near the end of life. Assessing pain and quality of life in my patients is an ongoing process. I received training in palliative care medicine and pain medicine at various Boston area hospitals for people, so my service is based upon pain and palliative care services at those institutions.

### WHAT KIND OF CASES AND PATIENTS DO YOU SEE IN ANGELL'S PAIN MEDICINE SERVICE?

Lots of my patients are referred from other specialty services. For example, our neurologists might send me a patient who has been diagnosed with a degenerative neurological disease and needs pain management, but the patient also has heart disease that makes treatment tricky. Many clients seek out the service because they cannot assess pain in their pets and are concerned about their quality of life. Extended appointment hours allow me to take an in-depth history and observe a patient exploring my exam room. That's the key to diagnosing chronic pain.

Because I see so many patients of advanced age, I diagnose a lot of dementia/cognitive dysfunction and spend a lot of time sorting out whether behavior changes in elderly animals are pain related or not. I am

particularly interested in patients with suspected neuropathic pain and those with cancer pain. And, although most of my patients are dogs, I love to see cats and small mammals!

### DO YOU OFFER HOSPICE CARE FOR PATIENTS?

That mostly depends upon how you are defining veterinary hospice care. My training in palliative medicine for people has shaped my definitions of hospice and palliative care. Most of my patients are receiving some treatment for their primary diseases, so they are not technically hospice patients (who are considered to be "actively dying" and are no longer being treated for their illnesses.) And, my patients are not actively dying even though they may be close to the end of their lives. I rarely have owners who ask that treatment be stopped and that their pets be allowed to die. Since my focus is on reducing pain and suffering, my goals of care are closer to that of palliative care medicine and that's how I label my work.

### HOW DID YOU BECOME INTERESTED IN BIOETHICS AND MEDICAL ETHICS IN PARTICULAR?

I can't remember a time when I didn't ask questions about the role of animals in human society and the moral status of animals. Before becoming a veterinarian I was an animal welfare officer at a place and time when pet overpopulation was overwhelming. That experience really colored my attitude when I began veterinary school. I've been fortunate to work at the MSPCA-Angell where considering the ethical dimensions of our veterinary practice has always been part of our values. My work on the Emergency and Critical Care service exposed me to years of clinical situations where big ethical dilemmas (financial constraints, requests for non-beneficial care, etc.) were part of everyday practice. Of course, since noting pain and suffering is my daily battle, the ethics of treating these patients is an obvious place to start.

But, it's clear that ethical dilemmas are part of all daily veterinary practice, because we have to balance the needs of our clients with our role as advocates for our patients. I've finished a post-graduate fellowship in bioethics and am now continuing my work as a research fellow in bioethics at Harvard's Center for Bioethics and Yale's Interdisciplinary Center for Bioethics. I've been amazed and gratified at how interested the world of bioethics is in veterinary medicine. I am currently working on bringing some of the tools developed to relieve ethical dilemmas in human health care to veterinary medicine. Moral distress is a big part of work stress for lots of us in veterinary medicine, so I hope that this work will benefit my peers and our patients, too.

For more information about Dr. Moses and Angell's Pain Medicine Service, visit [www.angell.org/painmedicine](http://www.angell.org/painmedicine).

Hear Dr. Moses speak at our Angell Sunday CE on April 9, 2017 at the Burlington Marriott. Dr. Moses is joined by Angell Anesthesiologists Kate Cummings, DVM, DACVAA and Stephanie Krein, DVM, DACVAA, as well as veterinary technician Jez Magarinos, RVN, CVT, VTS (Anesthesia/Analgesia) for this 5-credit CE (pending RACE approval). Topics include pain assessment, management of hypotension during anesthesia, use of end tidal CO2 monitoring, use of Alfaxalone, and an interactive, case-based panel discussion including veterinarian and technician perspectives. Visit [www.angell.org/CE](http://www.angell.org/CE) to register.

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We encourage you to contact Angell's specialists with questions.

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\*Boston-based radiologists and pathologists serve both Boston & Waltham locations

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## PATHOLOGY

Continued from page 7

all the more important to critically evaluate and appropriately apply grading schemes that are objective, evidence-based, and correlated with behavior.

For more information, please contact Angell's Pathology Service at 617-541-5014 or [pathology@angell.org](mailto:pathology@angell.org).

### REFERENCES

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