

Get Lost! Stranger-Directed Aggression in Cats

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While house soiling is one of the most common behavioral complaints and reasons for relinquishment, abandonment, and euthanasia in cats, aggression is a close second. Cats are commonly aggressive to other cats in their homes, and they may also be aggressive to people in a number of contexts. Stranger-directed aggression is likely an under-reported type of aggression in cats. This behavior is important because aggression to strangers can negatively impact the human-animal bond, cause significant injuries to people and other animals, and create an unsafe situation for medical personnel and pet-sitters. Cats that are aggressive to strangers are likely to be aggressive during veterinary treatment.

Aggression to strangers can develop as a cat enters social maturity, but it can begin in kittenhood as well. Fear and territorial motivations are common. Cats over age 3 that develop aggression to strangers while in an otherwise stable home environment, must be medically evaluated for a number of diseases that can increase irritability (hyperthyroidism, hypertension, osteoarthritis, neoplasia, infectious agents, etc.). These behaviors can be prevented in some cats with early positive socialization and positive experiences with strangers throughout the cat's life stages. It is important to note that "positive experiences" are defined by the individual cat. Owners and veterinarians who understand feline body language will have the best success at ensuring the cat's exposures to strangers set the cat up for immediate and future success.

As with most behavioral disorders, multi-modal treatment is recommended and should include avoidance/safe management, environmental enrichment, and desensitization and counter-conditioning to triggers. In some cases, medication may be warranted either during trigger times, daily, or both.

Safe management is critical to prevent the cat from practicing and being reinforced by the behaviors as well as to prevent injuries to strangers. The easiest way to manage cats who are aggressive to strangers is to keep them from having access to strangers completely. This can generally be done by creating a safe zone (such as a bathroom, guest room, multi-level cat cage, or large exercise pen +/- top) for the cat and putting the cat there BEFORE guests arrive and only allowing the cat out of the safe zone after the strangers leave. If the cat will be confined in the same area as the guests (like in a cat cage), it is generally best to cover the confinement zone so that cat can't see the visitors. It is also important to instruct visitors to completely ignore the cat (no petting, no talking, and no looking). Most cats can be taught to go to their safe zones when the doorbell rings within a few days to weeks if owners take a few minutes per day to work on the behavior with a *rational* behavior modification plan.

Unfortunately, management alone doesn't help teach the animal new ways to respond. This means if emergency personnel, pet-sitters, baby-sitters, house keepers, etc. ever need to enter the home the cat must be confined over the long-term for safety. Unfortunately, in an emergency, many families will forget to confine the cat. Families may also feel trapped at home when they can't find a pet-sitter.

Owners should be counseled not to handle cats that are in the midst of aggressive events because they may be severely injured. A thick blanket can be tossed on a cat in the midst of an aggressive event as can a glass of water or an upside down box. Shaken seltzer sprayed at the cat can be especially effective for stopping events in progress. There are emergency management techniques, not interventions for everyday use. Emergency items can be placed in potential trigger areas for easy access.

Because cats are acutely sensitive to being removed from their home environments, it is generally best for them to have in-home pet sitters when owners must leave. In order to make this safe, owners should experiment with confinement methods and potentially medications to reduce fear and aggression. If possible, the owners should get the help of a pet sitter who will be available over the long term. Then with the help of a rational behavior modification plan, the cat can be taught to tolerate or even "like" the pet sitter. If the cat is truly better when boarded away from home, this should be pursued instead.

Once owners know the cat's warning signs and specific triggers (door bell, petting, moving from standing to sitting, loud voices, smell of other cats on the stranger, etc.) treatment can focus on desensitization and counterconditioning. As treatment progresses, some cats may graduate from strict confinement to wearing a leash and harness during exposures and eventually may be able to be "at large" with strangers who can follow instructions (generally to ignore the cat strictly).

Environmental enrichment is a critical component of keeping cats behaviorally and medically healthy. Cats should eat as many meals as possible from puzzle toys, have appropriate play sessions with owners for at least 7 minutes per day, have multiple scratching posts, and be provided with multiple, soft elevated areas for resting and hiding.

Medications such as SSRIs, benzodiazepines, trazodone, and gabapentin can be helpful for cats with stranger-directed aggression. SSRIs are best given daily, but the other meds could be used at trigger times only even for several days at a stretch if needed.

Supplements, diet change, and pheromone therapy can also be helpful for some of these patients and can be implemented concurrent with medication protocols.

Patients with stranger-directed aggression can improve significantly with treatment. But treatment for this problem is not inherently obvious to most clients. They generally need guidance from a veterinarian skilled in applied behavior analysis and knowledgeable about normal feline behavior as well as psychoactive medication use. Thankfully, veterinarians are very capable of learning and implementing appropriate treatment and keeping their cat patients out of the “dog house.”

Hit Yourself with a Newspaper: Practical Treatment of House Soiling in Dogs

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House soiling can damage the human-animal bond and leave the animal vulnerable to re-homing, abuse, abandonment, neglect, and euthanasia. Therefore, veterinarians must understand the basics of coaching owners on house training.

House soiling is a normal behavior of dogs. Unlike cats, they are not naturally predisposed to use a bathroom facility humans readily provide without any actual training. Thankfully, most dogs are relatively easy to house train if owners follow instructions. Many young patients can be house trained in as little as a few days to a few weeks. A variety of techniques are recommended for housetraining. However, many are irrationally punitive, some are outright abusive, and many are ineffective. Science-based strategies for house soiling are well-known.

Many young patients can improve in their house training in as little as a few days with an appropriate plan. Patients who have been living in soiled environments, have been urinating/defecating on common substrates found indoors, or who have unknown training backgrounds can be harder to house train. The majority of shelter dogs can be house trained in 4 weeks if the owners are provided with 5 minutes of counseling at the time of adoption.¹

Medical co-morbidities, especially those causing PU/PD, urinary or fecal incontinence, pain during positioning for elimination behaviors, or diarrhea can cause previously house trained dogs to begin house soiling or complicate attempts at house training.

In addition, dogs may urinate or defecate in the home for reasons unrelated to voiding the urinary bladder or bowels. For instance, dogs urine mark and even fecal mark in response to a variety of internal and external triggers. Co-morbid anxiety and panic disorders can make it virtually impossible for even house trained animals to control their urination and bowel movements.

It is critical medical and/or behavioral co-morbidities be assessed and treated in order to see improvements in house soiling behaviors. Physical examination, stool sample, CBC, chemistry, urinalysis, urine culture and sensitivity, abdominal radiography including the entire urinary tract and gastrointestinal tract may be needed. Contrast radiography may also be helpful if abnormal anatomy is suspected. Abdominal ultrasonography, diet trials, anal gland expression, and empirical treatment for parasites may also need to be considered. These diagnostics are especially important when previously house trained animals begin to house soil. However, even puppies may need medical diagnostics if they are not improving quickly with rational behavior modification.

Behavioral co-morbidities such as fear, panic, anxiety, cognitive dysfunction, submissive urination, excitement urination, and urine or fecal marking can often be assessed with verbal history AND a video of the dog in the problem context (whenever possible and safe).

Uncomplicated house soiling behaviors such as those often exhibited by puppies, have a good prognosis. Treatment includes management to prevent accidents, improved access to appropriate elimination areas, and reinforcement of urination and defecation in the desired location.

Puppies and dogs with unknown house training capabilities should either be confined in a safe zone or attached to an adult with a leash whenever they are not in the elimination area. Successful confinement zones are secure and comforting for the animal. They include toys, soft resting areas, and flooring that is easily cleaned.

Crating when unsupervised is a traditional and effective management strategy for puppies and dogs who can tolerate this type of confinement. Crates should be large enough for the animal to stand comfortably and to turn around. Soft resting substrates, such as beds, can be provided to cover the crate floor. If the puppy or dog urinates or defecates in this area AND the animal was not confined so long that elimination was inevitable, the size of the confinement area and the animal's level of distress during confinement must be assessed. Animals that are fearful of confinement must be taught to be comfortable with confinement using positive reinforcement training. In the meantime, appropriate use of trigger time medications, pheromones and supplements (although not proven effective for this purpose) should be considered.

Animals who do not appear to have an inclination towards keeping their "dens" clean or whose owners cannot commit to providing time in an appropriate elimination area every 2 hours (at the start) must be confined in larger areas. These areas need to provide distance between an "appropriate" elimination area and a resting area. When providing an indoor substrate and location for elimination, it is ideal to provide the same substrate as outdoors or a substrate that is as close as possible. This decreases confusion for the dog as he/she learns about preferred areas for elimination.

If the animal is forced to eliminate on common household surfaces or to eliminate on himself or his bed, it is likely that house training will be prolonged. In addition, it is unethical to force an animal to rest in his/her excrement.

A schedule is critical to house training success. Dogs most often need to urinate and/or defecate after sleep, play, eating/drinking. A general rule of thumb at the beginning of house training is to take the animal to the preferred toileting area at least every 2 hours, after play, sleep, eating or drinking, and immediately before bed and after waking in the morning. He/she should also be taken to the

toileting area at any other time pre-elimination signals are given (such as circling, increased distraction from play, sniffing the ground, going to the door, whining, increased pacing/restlessness). The animal should be taken directly to the preferred toileting area (on leash or in arms if needed) by an adult. Once there, the animal should be allowed to sniff a several foot radius in the toileting area. Immediately (within 1-2 seconds) after the animal urinates or defecates, the animal should be given a powerful reinforcer (for many dogs this is a special food, but it could also be a short burst of play or access to the rest of the environment for those dogs who are not food motivated). It is best to make sure the animal urinates/defecates before you instigate play or take the dog on true walk. If the animal spends 10-15 min in the elimination area without eliminating, he/she can be taken indoors and either confined or strictly observed via leashing to an adult (sometimes called “umbilical cord training”). When the first possible pre-elimination behavior is exhibited the animal can be taken back to the toileting area and the process can be repeated. It is important to note, if an owner takes a dog outside to eliminate and then plays or takes the dog on a walk before the animal eliminates, he/she may accidentally teach the dog to ask to go out for play or walks rather than elimination. For those dogs who truly enjoy being outside, it is important to remember to allow them to stay outside for at least 5-10 minutes after they urinate or defecate. IF an owner takes them inside immediately after elimination, these dogs will often learn to hold urine or feces as long as possible so they can stay outside. This can be a problem in inclement weather or when an owner is in a hurry.

Punishment is contraindicated for animals who house soil. The typical “rub his nose in it” strategy is unnecessary and can cause dogs to fear handling as well as urinating/defecating in front of their owners. It is important dogs feel comfortable eliminating in the presence of people for medical and management reasons. Need a urine sample? Good luck with that if you’ve been punishing the dog for urinating in your presence. Need to take your dog out to eliminate on leash? You may have a struggle if you’ve accidentally taught your dog to fear urinating in front of you. In addition, dogs who are punished for house soiling often learn to urinate or defecate when the owner isn’t watching or in more hidden areas of the home. This makes house training more difficult in the end. This is why the old adage “hit the dog with a newspaper” has become “hit yourself with a newspaper.” It is the owner’s responsibility to provide the dog with adequate opportunity to urinate and defecate in preferred areas. If the owner has broken this contract by allowing the dog access to “unsafe” areas when he/she isn’t supervised or if the owner has not taken the dog out frequently enough to keep the bladder and bowels empty, there is only a person, not a dog, to blame.

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It's Not You, It's Me: Redirected Aggression in Cats and Dogs

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Redirected aggression is agonistic behavior directed towards an available target (victim) who is not the primary trigger. This often happens because the primary target is inaccessible to the aggressor.

Clinical signs

Cats

Growling, lip licking, tail thrashing, hissing, swatting, striking, screaming, yowling, piloerection, scratching, and/or biting

Dogs

Barking, growling, snarling, snapping, and/or biting (not in play)

Triggers are often unfamiliar animals, scents, or sounds. Available targets are generally owners and familiar/household animals. These events are more common in cats who have a history of noise or other fears.¹

Prevention

Proactive socialization during the puppy and kitten vaccination series and afterwards is strongly recommended to help prevent animals from becoming pathologically frightened by common environmental triggers resulting in redirected aggressive events.

Injuries

Victims can be severely injured. Affected animals are at high risk of euthanasia, abuse, abandonment, neglect, re-homing, or surrender to a shelter.

Duration

Variable. Onset is often sudden. In dogs, events often stop quickly after being triggered (within 60 seconds) and behavioral arousal may or may not stay elevated for hours or days depending on the individual dog's behavioral sensitivity and co-morbidities. In cats, events are often acute to the eyes of owners. However, history taking often, but not always, reveals an identifiable trigger and escalation pattern before the aggressive outburst. Once triggered, cats can stay behaviorally aroused and even potentially dangerous for several days.

Emergency stabilization and includes low-stress removal of the animal from the inciting trigger and the available target of the aggression until controlled introductions can be safely initiated. Cats exhibiting this behavior often benefit from a "cool down" period in a safe zone such as a bathroom, guest room, basement, or covered multilevel cat cage. This space should be quiet, have food, water, low lighting, toys, Feliway and/or Feliway Multicat, the cat's preferred litterbox and scratching materials. In susceptible cats, safe zones are often kept ready for use and may be utilized on a daily basis as each cat's individual core living area. For dogs, separating the dog and the target by baby gates or by rotating living areas may be sufficient.

Safe introductions require dogs who have bitten or threatened to bite be happy wearing leashes, body/head harnesses, and basket muzzles (see www.muzzleupproject.com for information). Cats need to be taught to stay happily in multi-level cat cages and/or to wear body harnesses and leashes. Animals can be taught to enjoy placement and wearing of these tools through positive reinforcement training.

Behavior modification includes desensitization and counterconditioning to the target, environmental enrichment, assessment/improvement of the species-specific basic needs plan, desensitization and counter-conditioning to the trigger (if identifiable), relaxation work, positive reinforcement training for specific cued behaviors (Watch Me, Go To Room/Mat, U-turn, etc.) and treatment of any co-morbid behavioral pathologies.

Medications can be very helpful, especially in cases where the behavior is frequent, injurious, and/or complicated by medical or behavioral co-morbidities. SSRIs and TCA's are frequently prescribed. Trigger time medications such as clonidine, trazodone, and gabapentin may also be useful. Benzodiazepines are controversial for use in cases of aggression, however, in the author's experience they can be quite helpful, especially early in treatment for cats with this disorder.

Animals with re-directed aggression can improve with appropriate, efficient, and pro-active treatment. Without treatment, redirected aggression can cause severe injuries, cause family relationships to decompensate significantly, and lead to the patient's death. In order to help affected families, a behavior consult should be performed to create a multi-modal action plan with structured follow-up.

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Make it Stop! Unruly Behaviors and How Vets, Clients, and Bad Trainers Accidentally Make them Worse

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Why should a veterinarian know the basics of treating unruly behaviors in dogs?

Some dogs have serious behavioral problems that pose safety and welfare issues for their families. But even very common, easily corrected unruly behaviors (jumping up, pulling on leash, barking, etc.) can result in dissolution of the human-animal bond and lead to euthanasia or surrender.¹ A 1998 study by Dodman and Patronek estimated that approximately 224,000 behavioral euthanasias were performed and that many veterinarians didn't feel comfortable performing behavioral euthanasias. However, it also showed that many veterinarians don't ask about behavioral issues routinely and are uncomfortable handling behavioral them.²

An unruly behavior is a normal dog behavior that is not preferred by most human households. These behaviors are encouraged by the inadvertent application of learning theory and lack of exercise, social structure, and enrichment. Unruly behaviors are a common source of discontent amongst owners, but they can also be a great opportunity to help bond a client to your practice and improve the quality of life for your patients. Inefficient attempts at controlling unruly behaviors can leave owners frustrated and their dogs vulnerable to inappropriate attempts at correcting these behaviors. Many trainers market themselves as capable of improving unruly behaviors. Certainly, they should be able to. However, because animal training is a completely unregulated industry, it is vital veterinarians know how to guide clients on finding appropriate support from a skilled, positive-reinforcement trainer. Otherwise, the veterinarian must realize educating the client and supporting the human-animal bond is so critically important the veterinarian him/herself, must facilitate treatment. As owners become more frustrated, the risk that the dog will be surrendered, re-homed, euthanized, neglected, or abused increases.

What behaviors are not unruly?

Behaviors that are due to a significant lack of impulse control, involve true threats (barking, lunging, growling, snarling, snapping, and biting that are not part of obvious play) or underlying anxieties, fears, or phobias are not unruly. While clinical signs may be similar, the underlying motivation is more complex than normal dog behavior exacerbated by inappropriate use of learning theory, lack of appropriate exercise, and/or lack of appropriate enrichment.

Whenever a client discusses a behavior issue with a veterinarian, it's important to first find out if the behavior is dangerous to the dog or others. Additional issues to be assessed include: the underlying motivation and the dog's body language; whether the behavior is a normal dog behavior; what training techniques have been used to improve the behavior; the owner's understanding of normal dog behavior and of learning theory; and the owner's expectations and ability to implement a training plan. Behaviors, such as aggression or other anxiety disorders, which pose a threat to human or animal welfare should be referred to a veterinary behaviorist as soon as possible. Unruly patients should be referred to a thoroughly vetted positive-reinforcement trainer for additional hands-on coaching.

Basic building blocks for correcting unruly behaviors

Most unruly behaviors will improve with basic management including adequate exercise, enrichment, and social structure including basic training cues (such as sit, down, look, and touch). Ideal levels of exercise vary based on each patient's medical history and signalment. In general, young, healthy dogs should have at least 1-2 hours of aerobic exercise daily. Supervised access to the outdoors should be part of the exercise plan so as to maximize the dog's opportunities to perform species-specific exploratory behaviors. Enrichment activities that involve providing all meals in puzzle toys, setting up puzzle-solving games, and trick or agility training help dogs use their natural exploratory behavior and fill their time budgets with healthy, acceptable activities. It is important that owners start with easy activities so that the dogs don't get too frustrated to engage. Then they can continue to target games to the skill level of their dogs, gradually increasing the level of difficulty. Social structure can be improved using a program in which attention is given to the dog only at the owner's initiative, the dog performs a behavior (usually sit) on the owner's verbal/body language cue, behaviors that the owner doesn't want to reinforce are completely ignored, punishment is limited to removal of anything that might reinforce the behavior, potentially problematic situations are avoided, and behaviors are redirected before they have the opportunity to intensify.

Knowing how dogs learn

Dogs learn according to the same rules as other species. The most frequently recommended learning schemes use negative punishment, positive reinforcement, and negative reinforcement. Positive punishment is rarely considered a reasonable or ethical first-line treatment for behavioral problems. Negative punishment is the removal of something the dog wants in order to decrease the likelihood that the target behavior will occur in the future. For example, an owner turns away or leaves the room when a dog jumps up in order to decrease future jump up events. Positive reinforcement is the addition of something the dog wants so as to increase the

likelihood that the target behavior will occur in the future. For example, if an owner notices that his/her dog is resting quietly during dinnertime, he/she may toss a small piece of food to the dog in order to increase the likelihood that that the resting behavior will occur during future dinners. Negative reinforcement is the removal of something the dog finds aversive as soon as the target behavior occurs. This removal increases the likelihood that the target behavior will occur in the future. For instance, a properly handled head halter will apply pressure over the nose when the dog is pulling. This pressure over the nose will immediately release when the leash is loose, thereby increasing the likelihood of loose-leash walking in the future. Positive punishment is the application of an aversive stimulus in order to decrease the likelihood that the targeted behavior will occur in the future. For instance, if a dog jumps up to greet, and the owner wants to decrease this behavior using positive punishment, the owner might pinch the dog's toes when the dog jumps up.

Common unruly behaviors

Attention-seeking behaviors

Many so-called "unruly" behaviors are really attention-seeking behaviors (pawing, licking, barking, nudging, mounting, destructiveness in the owner's presence, theft, etc.). They often develop from normal dog behaviors when people accidentally reinforce them, usually intermittently. The history of intermittent reinforcement can make these behaviors quite resistant to extinction over time. Attention-seeking behaviors are almost always treated by removing attention immediately and consistently every time the dog performs the behavior (for instance, leaving the room if the dog steals an item, leaving the room if the dog jumps up, etc.). In addition, the owner is encouraged to proactively pay attention to the dog when it is performing acceptable activities (resting, playing with his/her own toys, greeting with all four feet on the floor, etc.).

Mounting

Mounting behaviors can be part of normal play. Other causes for mounting include attention-seeking, social jockeying, and sexual motivations. Mounting can be a displacement behavior in some dogs. Treatment includes assessing whether the behavior is problematic or not (for instance, some mounting between dogs is normal and may not be a problem). Use of a previously learned cue (such as touch or coming when called) to move the dog away from situations that often stimulate mounting can be very helpful. Controlled behavior modification sessions can also lead to improvements. For instance, a dog that mounts visitors could be taught to play fetch with them or chew on a special toy while they are present. Attention-seeking mounting can be decreased by completely ignoring the dog or moving the dog to a time-out for a few minutes and making sure to reward at least 10 appropriate behaviors each hour. Sexual motivations for mounting can be improved by neutering in many cases.

Jumping up

Jumping up is a normal behavior. It is encouraged by normal human behaviors such as patting the chest, petting the dog when he/she jumps up, and hugging the dog. Since many dogs actively want to investigate or lick faces of other dogs and humans, they may jump up to do so unless people lean down. Many people inappropriately use punishment while intermittently and accidentally rewarding this behavior. For instance, a person may knee a dog in the chest when he/she jumps up and the person is wearing work clothes, but encourage the dog to jump up at other times. Jumping up is treated simply by turning away from the dog or leaving the room when he/she jumps up and turning around/returning and paying attention to the dog as soon as all four feet are on the floor. More structured training can also be helpful (such as teaching the dog to sit for all interactions including greetings).

Pulling on leash

Teaching a dog to walk on a loose leash is very challenging for most families. It requires a significant amount of patience and impulse control for both the dog and the walker. It is very important that handlers remember that, in general, dogs walk much faster than people. Walking at a human pace can be quite frustrating and unnatural for them. Like any unnatural behavior pattern, walking on a loose leash takes more time to learn and requires a higher rate of reinforcement than easier, more natural behaviors.

Many devices are purported to be useful for stopping pulling. While a skilled or very patient handler can teach a dog to walk on a loose leash with a regular leash and buckle collar, most people reach for some type of walking tool designed to improve control. Choke, prong, and electric collars are almost uniformly inappropriate for this type of work, since the pain they cause can make dogs fearful of stimuli that are associated with the discomfort. Head halters, front-attaching body harnesses, and body harnesses that tighten somewhat around the barrel of the chest can all be helpful aids while working on loose leash walking. There are multiple methods for teaching loose leash walking. In general, they focus on various ways to reinforce walking beside the owner (such as high-frequency, small treats given beside the owner's leg or clicking and treating every time the dog is within the range that the handler finds acceptable). When the dog pulls, many methods encourage the handler to stop the walk completely or turn in the opposite direction until the dog comes back to the handler.

Mouthing

Mouthing is a common behavior of puppies that can extend into adulthood if the owner doesn't respond appropriately to it. Many different methods of discouraging mouthing behavior are reasonable and some can be used in combination. A common method for teaching dogs not to mouth people or to attenuate their bite pressure is to end all games consistently when mouthing of a person occurs. One way to achieve this is to keep the dog in a confinement zone even during play (such as one room or an exercise pen). If

the dog mouths, the person immediately gets up and leaves the dog for at least several seconds (or until the dog is doing a behavior that the owner wants to reward by returning). Another option is to take the dog to a previously determined time-out spot and ignore him/her until the dog is performing a behavior that the owner wants to reward by returning. Some people may benefit from using taste aversion substances on their hands or clothes as they initiate this work, especially if the dog is large or bites are painful. Used alone, taste aversion substances are unlikely to solve the problem in very mouthy dogs. Dogs that are very mouthy can also benefit from being taught to carry items in their mouth during times when mouthing is a problem. Creating other targets for mouthing behavior can be helpful (for instance, controlled tug games). Muzzles can be utilized when trained appropriately for severe, intractable, or unpredictable situations.

Destructive behavior

Destructive behavior is often a consequence of normal exploratory behavior, especially in juvenile and adolescent dogs. This behavior can be attenuated by providing adequate stimulation in the form of rotating food-dispensing puzzles and other toys/games in combination with trained confinement and appropriate exercise. Destruction of toys is a normal part of dog behavior. Destruction of stolen items can occur merely due to their novelty. Targeting of stolen items can be a learned behavior in some dogs; an intelligent dog quickly discovers that grabbing eyeglasses off of the coffee table increases owner interaction much more quickly than playing with that same old rope toy.

Vocalizing when confined

It isn't natural for dogs to be confined for long periods. In general, teaching a dog to be crated should be a gradual process during which the dog learns that very special things happen in the crate, that there is no need to panic in the crate, and that vocalizing, scratching, and so on are ineffective at getting the dog out of the crate. Beginning crate training often starts with teaching the dog to go into and out of the crate on cue. Gradually the door can be closed behind the dog for longer and longer periods with the owner either leaving a long-lasting food-dispensing toy inside the crate or making a commitment to reinforcing the dog by hand intermittently while the dog is in the crate.

Excessive barking

In general, barking is a normal behavior that is frequently accidentally reinforced by humans. There are many motivations for barking including attention-seeking, play-related, fear/threat-aversion, behavioral arousal, cognitive problems, distress or anxiety, etc. Excessive barking must be treated on a case-by-case basis, taking potential motivations into account. In general, attention-seeking barking should never be rewarded. Instead, the owner should focus on paying attention to the dog when he/she is quiet. For instance, a family whose dog barks for food while they are eating could use a combination of confinement and rewards for quiet behaviors (tossing treats, using an automatic food dispenser, or providing the dog with a long lasting food-dispensing toy).

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Out the Window: Multi-Modal Treatment Options for Thunderstorm Phobia

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Thunderstorm phobia is a behavioral disorder commonly seen in adult dogs. It causes significant amounts of suffering for veterinary patients and the families who love them, and without appropriate treatment it can worsen with time. This negatively impacts the patient's overall welfare and increases the risk of the patient being abandoned, abused, neglected, rehomed, or euthanized.

Undertreated thunderstorm phobia is a known, yet largely preventable, cause of death in dogs.

While some dogs will be triggered only as the thunder of a storm starts and recover as soon as it ends, many will experience suffering that expands outside of the weather event. Especially upon repeated exposure, certain patients will begin to experience the symptoms of thunderstorm phobia earlier and earlier in the process of the weather event, and they may also take longer and longer to recover. Occasionally, a patient may hide (for instance, under the bed) and resist removal attempts for several days.

Common triggers include thunder, lightning, rain, wind, and changes in barometric pressure. However, many dog will also learn to associate flashing lights (not associated with storms), darkening skies/clouds, owner pre-storm routines, non-thunder noises (sirens, garage doors opening or closing, fluttering flags, etc.) with the possibility of an oncoming storm. These patients are exhibiting full blown anxiety disorders triggered by storms.

Symptoms include, but aren't limited to: pacing, panting, hiding, destruction (often focused on "escape" such as going through windows, biting door frames, scratching at barriers used for confinement, etc.), anorexia, trembling/shaking, inability to move (catatonia). Many patients with thunderstorm phobia will crawl on owners and seem to be soliciting petting or holding. However, video assessments of these patients often reveals the patient is not comforted by physical contact. Traumatic injuries, especially during escape or destructive behaviors are common. They include, but aren't limited to, broken claws (especially on the front feet), tooth damage/breakage (especially of the canines), high rise injuries from jumping out of windows, hit-by-car injuries due to bolting behaviors, lacerations of the paws, face, and legs, etc. It is worth noting for those patients for whom hiding and withdrawal is a primary clinical sign, this diagnosis is likely to be missed and it's severity under-estimated.

In severe cases, the patient's disorder may worsen to the point where a generalized anxiety disorder including generalized hypervigilance, excessive startle, persistent environmental scanning develops. These cases warrant immediate referral to a local veterinary behaviorist or a telemedicine consult between the primary care veterinarian and a veterinary behaviorist if there is no local option.

Definitive diagnosis is often easiest when video is available for review. However, if owners have witnessed behaviors consistent with the disorder and the behaviors are not present when storms are absent, thunderstorm phobia can be presumptively diagnosed. At the first

Separation anxiety, noise phobia, and thunderstorm phobia are frequently co-morbid.¹ In addition, many dogs with thunderstorm phobia have other fears, phobias, impulse control disorders, and/or anxieties. When the thunderstorm phobia is triggered it can worsen other behavioral pathologies significantly causing the patient to rapidly decompensate and subsequently increasing the mortality of the disorder.

Multimodal, immediate therapy is preferred. Proactive behavior modification for teaching the animal new coping strategies, event management protocols, anti-anxiety supplements, pheromones, tools, and psychoactive medications are often used together to promote remission of this anxiety and panic disorder.

Improving any behavioral disorder begins with resolving deficiencies in basic, species-specific total health management. Adequate water, food, shelter, play, exercise in non-threatening environments, social interactions with preferred associates (keep in mind, some dogs strongly prefer interactions with humans to interacting with other dogs), daily reward based training, and proactive treatment of any medical conditions must be addressed.

Once there is a plan in place for these basic needs, families need help **keeping the animal feeling safe**. The learner (AKA the dog) tells us what feels "safe" for him by his behavior. Is he willing to eat, play, and interact in his usual way with the environment and his family? If so, he is likely feeling safe. If even one of these changes negatively (decreased appetite for food in a normally food-motivated dog, for instance), then either the outside environment or the microenvironment (neurotransmitters and other physiological cascades) need to be supported to help the patient feel safe.

These dogs need a "safe" place to rest during storms or perceived weather events. Safe zones are defined by the patient. Ideally, a safe zone (AKA storm bunker) is a windowless room or a room with curtains/blinds. This room is on the inside of the home floorplan or in the basement when possible. Many dogs choose closets, bathrooms, or crates for their storm bunkers when given the freedom to choose. Classical music or white noise can help drown some outside noises.

All dogs with thunderstorm phobia deserve to have their suffering relieved through the pro-active and rational use of medications. Trigger time medications, such as clonidine, trazodone, and many different benzodiazepines can be exceptionally helpful for these patients. For patients who are triggering outside of specific weather events, daily SSRI or TCA support should be considered. Trigger time and daily medications are often combined in affected patients in order to improve speed of solid recovery. In one study, patients who were treated with clomipramine and alprazolam during a thunderstorm season maintained their improvements into the next thunderstorm season.² This indicates that medication in these patients is not only a bandage for acute events, but also helps the brain pathology heal.

Behavior modification should be worked on at least 5 minutes per day (ONLY on non-storm days). It includes desensitization and counter-conditioning to each patient's individual triggers and relaxation coaching that includes the storm bunker. For practitioners new to behavior or without the time to do in-depth behavioral counseling, a step in the right direction would be to recommend any of a few different noise desensitization and counterconditioning audio packages that include structured behavior modification plans. In addition, a relaxation and massage work can improve the patient's baseline anxiety levels and increase his/her ability to tolerate trigger situations in the long term.

Specific anti-anxiety tools such as body wraps, shirts, capes, caps, goggles, head phones, and ear plugs are available to help ameliorate trigger intensity. Efficacy is patient dependent. However, one study showed significant improvements in patients wearing a body wrap during thunderstorms.³

Pheromone therapy may be supportive in some patients.⁴ A variety of supplements can also be tried, but these should not be considered cornerstones of treatment for thunderstorm phobia. Supplements should be used in conjunction with psychoactive medications, behavior modification, and management for the best outcome. All supplements should be sourced from viable veterinary-specific providers who have researched the supplements they sell, assure consistency of product, or at least are sensitive to and reaching out for veterinary insight, criticism, and support. Your local board-certified veterinary behaviorist can guide you as to his/her anecdotal experience for situations where higher power evidence is lacking.

Symptoms of thunderstorm phobia can be significantly improved in most veterinary patients when treatment is immediate, proactive, and multi-modal. In addition, improvements can carry over into future thunderstorm seasons with certain protocols.

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Safe at Home: Quick and Practical Tips for Owner-Directed Aggression in Cats and Dogs

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Aggression to owners is a common problem in many species of pets and it negatively impacts the human-animal bond. It can lead to relinquishment, abandonment, neglect, abuse, and euthanasia. Thankfully it can be improved significantly in many cases with science-based interventions. And many types of owner-directed aggression can be prevented with appropriate, reward-based training and timely socialization.

Aggression to owners can begin early in life, but it commonly develops as the animal hits social maturity. Common motivations include but aren't limited to pain, fear, response to punishment, resource guarding of food or space, problems with physical handling, and social conflict.

Prognosis is dependent on a number of factors such as family composition and health, willingness to implement a science-based plan, severity of injuries, degree of warning, number of triggers, ability/willingness to avoid triggers, predictability, and co-morbid medical and behavioral disorders.

The best treatment is multimodal, as for most behavioral disorders. A combination of avoidance and management, environmental enrichment, desensitization and counter-conditioning, psychoactive medication, supplements, dietary change, and pheromone treatment should be considered.

Clients often require help creating a list of specific triggers. Once this list is developed, management plans should be developed for each trigger. For instance, if the dog is aggressive when people approach while he/she is eating, then the dog should only eat in a crate or in a private area where eating can be undisturbed. If the dog is aggressive when people pet him/her, then petting in the trigger area must be avoided.

Safety tools like baby gates, crates, leashes, head halters/body harnesses, basket muzzles, etc. should be implemented proactively and used in trigger situations. Patients often need to be trained using positive reinforcement to enjoy resting in crates and wearing basket muzzles (www.muzzleupproject.com is a great resource for owners working on this). At this time, cat muzzles for frequent wear are not generally available, so confinement and leash training is a cornerstone of safe management for those cats who might bite or scratch.

Avoidance and safe management are the minimal interventions for these behaviors. For some families they may seem sufficient. However, affected families are strongly recommended to implement environmental enrichment and behavioral therapy with a science-based trainer and/or a veterinary behaviorist if available. Unfortunately, avoidance can fail for a variety of reasons. One unlocked door can result in a bite after all.

Environmental enrichment is species specific and also should be individualized to each patient's needs. In general, both dogs and cats need adequate, pleasant exercise, food puzzles rather than food in bowls, reward-based training, resting/hiding areas where they can remain undisturbed if they prefer, vertical and horizontal scratching areas for cats, and the ability to use as many of their safe, natural tendencies as possible.

Behavioral therapy can often be successful in only a few minutes per day. Specifics depend on the characteristics of the individual animal's disorder. However, behavioral therapies should minimally be pleasant for the patient, and ideally they should be fun for both owners and patients. Positive punishment (yelling, hitting, kicking, alpha-rolling, scruffing, grabbing, staring the animal down or handling the animal in any way that is designed to be threatening) is completely contraindicated because it can result in escalation of the behavior problem in the moment and in the future.¹

Medications, such as SSRIs or TCAs, are often considered and may be prescribed as long as there is a valid VCPR and the clients understand the off-label nature of all medications for aggression in cats and dogs. Supplements, diet change, and pheromones may also be helpful for some patients.

Most patients will improve with treatment within 4-8 weeks if families are following instructions. However, lifelong management and safety remain important for these patients.

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Trigger Time! Medication Options for Situational Anxiety, Panic, and Phobia

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One of the most complex issues that veterinarians face when managing behavioral problems in practice is when to prescribe psychoactive medications. Multiple levels of analysis and refined administration protocols are required in order to ensure rational use these medications.

The first thing a veterinarian considering prescribing a trigger time medication should be thinking about is whether there is a valid veterinary client relationship. If none exists, then no medication can be prescribed legally. In addition, all frequently recommended trigger time medications are off-label for use in companion animals.

Extra-label drug use is rational when the patient and/or family is suffering from a behavioral problem, when the patient is a threat to himself or others. However, these medications, like all psychoactive medications, should be used only in combination with safety tools, aggression/anxiety management techniques, environmental management, and a rational, science-based behavior modification plan.

Choosing an appropriate medication for trigger time use is a complex process, but it is no different from medication decisions in other parts of veterinary medicine. The veterinarian must take into account multiple facts individual to the case (species, signalment, history, diagnosis, medication history, medical and behavioral co-morbidities) as well as the published data on efficacy and side effects for the specific medications being considered. A monitoring plan for treatment must be implemented as well as a safety plan. Potential side effects need to be discussed with family members. Route, cost, and duration of treatment must also be addressed.

Medications used only during trigger times need specific characteristics. They need to work quickly, last long enough to be helpful, have a side effect profile that doesn't negatively impact the patient or the family members' quality of life, and be affordable. In addition, it's helpful if these medications have a dose range that allows family members to titrate the patient's most effective dose.

Commonly used trigger time medications include the benzodiazepines, trazodone, and clonidine

The benzodiazepines alter GABA (gamma-aminobutyric acid), the most widespread inhibitory neurotransmitter in the brain. This neurotransmitter moderates vigilance, anxiety, muscle tension, neuronal excitability, and memory (too much GABA can inhibit memory). Medications that increase GABA effects include diazepam, clonazepam, lorazepam, alprazolam, and oxazepam. These medications can be reversed with flumazenil. These medications are used off-label for control of anxiety¹, phobias², and historically urine marking³). They are controversial for cases where aggression is the primary complaint or a behavioral co-morbidity. Side effects include sedation, ataxia, increased appetite, muscle relaxation, paradoxical excitation/anxiety, idiopathic hepatic necrosis⁴, and impaired learning. Impaired learning is not a rational reason to exclude this category of medications from your tool box because anxiety, panic, and fear also impair learning. Dose decreases accommodate patients who have altered hepatic or renal metabolism, are taking other medications metabolized by CYT P450, are obese, or are elderly. With long term use, there is a chance of physical dependence and dose tolerance. Patients need to be weaned off benzodiazepines if they have been on these medications daily for a few weeks. Generally they are decreased by 25% weekly until the medication is discontinued completely. However, if they are truly being used as-needed for intermittent trigger times, weaning is unnecessary.

Dopamine blockers (most commonly acepromazine) are often used inappropriately for trigger times in patients with panic, phobia, anxiety. This medication is on-label for dogs, cats, horses for "control of intractable animals" and as an anti-emetic. However, it is not a true anxiolytic; rather, it is a conventional anti-psychotic. Acepromazine can be useful in combination with benzodiazepines and other trigger time medications when anxiolysis with more appropriate interventions has been insufficient to help calm the patient. Side effects (sedation, ataxia, aggression, hypotension/paradoxical tachycardia, and paradoxical excitability) can be prolonged and onset of best action can take several hours.

Trazodone is published for use in patients with anxiety disorders and for post-op calming of active patients.^{5,6} Trazodone is a serotonin antagonist/reuptake inhibitor. Veterinary studies report improvement in clinical signs around 60 to 90 min after administration in most patients. The medication is not controlled, readily available, and relatively inexpensive. Nausea is a side effect that can be prevented in many patients by starting at the low end of the dose range and titrating up as-needed. Other side effects, such as ataxia, sedation, panting, increased anxiety, agitation, or irritability can occur. The potential for priapism precludes this medication's use in most intact, breeding males. This medication can be used safely, if carefully, with SSRIs, TCAs, clonidine, benzodiazepines, and even acepromazine.

Clonidine is published for use in canine patients with fear-related aggression, noise phobia, and separation anxiety.⁷ This alpha-2 agonist works by blocking NE release in the locus ceruleus and is effective in 60-90 min for many patients. It is not controlled, readily available, and relatively inexpensive. Side effects include sedation, ataxia, increased agitation, anxiety, and irritability, as well

as nausea. This medication can be used as a single agent or rationally with SSRIs, benzodiazepines, or trazodone if additional control of panic is required.

Gabapentin is used anecdotally in patients requiring trigger time meds who may also have neuropathic pain and/or do not respond to other interventions. It is also used for patients who have drug interaction issues precluding use of other more well-researched anti-anxiety medications. While it was once considered to work on GABA, it is now thought that it may function by altering glutamine. The dose range is wide and the short half-life requires re-dosing at least every 8 hours for most patients if control is required for an entire day or several days. This medication is relatively inexpensive, readily available, and not controlled. It can be used safely in combination with SSRIs, TCAs, benzodiazepines, clonidine, trazodone, and acepromazine.

There are a variety of medications that can be helpful for patients who are anxious, panicked, or phobic in specific situations. These medications can be used as monotherapies or combination therapies. They can be combined with other medications if needed. In addition, they can be used just as-needed or daily with additional bolus doses for trigger times. Situational anxiety, panic, and phobia can lead to death of patients through traumatic injuries as well as through abuse, abandonment, and euthanasia. Thankfully, most patients can improve quickly with treatment.

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Abnormal Repetitive Behavior: Circle, Snap, and Stare, Oh My!

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Is it behavioural or is it medical?

Behavioural signs can be the first or only indication of an underlying medical issue. Therefore the first step is to identify all presenting signs and do a comprehensive assessment to determine if there is an underlying medical cause. Conversely the presence of a behavioral inciting factor or a known breed predisposition in the absence of abnormal medical findings should point to a behavioral cause. In addition, stress may cause or contribute to dermatologic, gastrointestinal, and urinary tract disorders.

Abnormal repetitive behaviors

Repetitive behaviours in companion animals have been termed compulsive, obsessive-compulsive, and stereotypies, or may arise from other behaviour pathology including hyperactivity disorders and dissociative syndrome.¹ One recent paper identified a link between tail chasing in Bull Terriers and autism in humans.² Since these behaviours likely represent a heterogeneous group of conditions with differing pathologies, abnormal repetitive behaviour (ARB) might be used to describe the clinical presentation until a diagnosis can be made.

When presented with an ARB, the first step is to identify all presenting signs and to determine whether these signs are due to an underlying medical cause. The diagnostic dilemma is further complicated by the fact that the behaviour (e.g. self-trauma) can lead to medical complications including pain, inflammation, and infection. Stress may also contribute to the medical signs. Even if a medical problem is identified and treated, behavioural signs may persist due to alterations in neurotransmitters and receptors, further learning and owner responses that stress, frustrate or reinforce the pet.

Compulsive disorders

Compulsive disorders are abnormal, repetitive, variable in form and fixated on a goal. They may be sufficiently exaggerated, intense, or sustained that they cannot be easily disrupted or switched to another behavior. In addition, there may be a lack of control in initiating or terminating the behaviour. Compulsive disorders such as self-trauma, circling or tail chasing might initially arise as displacement behaviors arising from conflict or frustration. Conflict is when the pet has competing motivations or uncertainty, while frustration is when the pet is motivated to achieve a goal but physically or behaviorally prevented. Displacement behaviors might resolve if the inciting factors are avoided and the conflict or frustration addressed. In fact, dogs displaying repetitive behaviors at times of high arousal are distinct from those displaying stereotypic behaviors in which arousal is low.

In compulsive disorders signs begin to arise outside the original context and begin to impact on normal daily functions. They are derived from normal behaviors such as grooming, predation, or ingestion. There may be a genetic disposition with breed predilections such as tail chasing in German Shepherds, spinning in Bull Terriers, wool sucking in Oriental cats and flank and blanket sucking in Dobermans, for which a genetic locus has been identified.³

Abnormal serotonin transmission has been identified as a primary mechanism by which compulsive disorders are induced. Brain areas of interest include the prefrontal cortex and amygdalae. As in humans with obsessive compulsive disorders, drugs that inhibit serotonin reuptake (e.g. clomipramine, fluoxetine) are most effective. However, multiple neurotransmitters have been implicated including alterations in dopaminergic and glutamatergic pathways or opioid receptors.⁴⁻⁶

Stereotypies

Stereotypies are defined as repetitive behaviors that are unvaried in sequence and have no obvious purpose or function. They have been commonly reported in farm, zoo, and laboratory animals and arise in situations of conflict or frustration related to confinement, husbandry, or deficits in housing. They may arise when the environment lacks sufficient outlets for the animals full behavior repertoire, with maternal deprivation, and due to neurologic disorders. Stereotypic behaviors, at least in their early stages, may provide a mechanism for the pet to cope. For example, non-nutritive suckling in calves may aid in digestive processes. Stereotypies might be induced by dopaminergic stimulation.⁷

Differential diagnosis

Even if no medical causes are found, a therapeutic response trial might still be required to differentiate medical (e.g. seizure, dermatologic, gastrointestinal) from behavioral. Focal seizures might be the cause of neurologic signs; self-traumatic disorders might be due to hypersensitivity reactions; and ingestive behaviors might be caused by gastrointestinal diseases. Feline hyperaesthesia can have a dermatologic, neuromuscular, or behavioral cause.

Neurologic or behavioral

Some of the most difficult cases to diagnose are signs that might be attributed to neurological disorders such as circling, air snapping, fixed staring, tail chasing, spinning, pouncing, star gazing, head shaking and checking. Behavioral signs may be associated with virtually any disease that affects the CNS or its circulation.

Careful review of all clinical signs, video of the problem, physical and neurological exam, and diagnostic tests including blood, urine, imaging, or EEG may need to be considered if a neurologic cause is suspected. With neurological deficits, altered mental status, increased sleep, circling, head pressing, seizures, emesis, or altered eating and drinking, a neurologic diagnosis can be made. However, behavior signs may arise in the absence of neurologic signs. Changes in behavior, personality, or mood, decreased responsiveness to stimuli, or loss of previously learned behavior including housetraining indicate forebrain disease. Altered responsiveness to stimuli can also arise from sensory or motor dysfunction.

Epilepsy is a rule-out when pets are presented with focal motor or sensory signs or altered mood or temperament. Seizures may be generalized with convulsions and loss of consciousness but focal seizures may present with motor or sensory signs such as fly biting, chewing, swallowing, star gazing, tailing chasing and aggression. In one study of dogs with fly snapping or “fly catching syndrome” (10 of which were CKCS) and all of which had initial neurological assessment including some or all of MRI, CSF, EEG and BAER testing, 34% of 11 dogs improved with phenobarbital (2-3 mg/kg bid) and 100% of 11 dogs with fluoxetine at 1 mg/kg bid (as defined by 50% or greater response). Two of these dogs were CKCS with Chiari malformation.⁸ Concurrent signs in some of the dogs included licking in the air; face, neck and ear scratching; tail chasing; and hind limb biting. Behavior causes must also be differentiated from other episodic events including tremors, narcolepsy, and syncope.

Unlike seizures repetitive behaviors can generally be interrupted or the situations in which they arise predicted or reproduced. Some pets are so intent on repeating the behavior that they will move away and repeat the behavior in the owner’s absence. Oral behaviors including air snapping, licking, sucking, pica, smacking lips, and gulping can also be a result of a gastrointestinal disorder.^{9,10}

If diagnostic testing is unable to yield a definitive diagnosis, a therapeutic trial may be the next option. For focal seizures, an improvement might be expected with phenobarbital, potassium bromide, or levetiracetam while gabapentin, carbamazepine or clonazepam might be added for refractory cases. When neuropathic pain is a consideration a trial with gabapentin, pregabalin, carbamazepine or amitriptyline might be warranted. A trial with drugs or dietary management might be needed to rule out a gastrointestinal cause. For compulsive disorders, clomipramine or fluoxetine might be the first choice.

Dermatologic or behavioral

To diagnose behavioral self-trauma (e.g. biting, chewing, licking, and excessive barbering) medical causes must first be excluded including pain or pruritus (e.g. neuropathies, hypersensitivity reactions), infections, tumours, endocrinopathies or systemic diseases (e.g. hepatocutaneous syndrome). The diagnostic work up should include examination, blood and urine testing (including viral or endocrine if indicated), and dermatologic testing including trichogram, fungal culture, skin scraping, cytology and possible biopsy. The presence of primary lesions and the sites of the alopecia or self-trauma might suggest other potential diagnoses.

For cats with self-trauma, if diagnostic tests are negative, parasitic hypersensitivity, food hypersensitivity and atopy must still be ruled out. Therefore a therapeutic trial with a parasiticide and a novel or hydrolysed protein diet for at least 8 weeks might be instituted, followed by a steroid response trial to rule out atopic pruritus. Using this protocol in 21 cases presented for psychogenic alopecia, 76% had a medical aetiology (primarily adverse food reactions, atopy or both), 10% were compulsive and 14% were combined medical and behavioral. Although biopsies might indicate an inflammatory response, some cats with histologically normal skin had a medical cause.¹¹

For acral lick dermatitis, when diagnostic tests do not identify the cause, therapeutic trials with antibiotics, pain medication, anti-inflammatory drugs, a food trial or parasiticides should be implemented. However, antibiotic selection is a challenge since cases may be multi-drug resistant and deep cultures may not be consistent with superficial cultures. Owner supervision and preventive mechanisms such as bandaging or E-collars may also be necessary to allow the lesions to heal.

Tail mutilation and hyperaesthesia in cats might be seen in situations of high arousal but can be due to focal seizures, spinal disease, neuropathies, FeLV induced myelopathy, neuropathic pain or compulsive disorders. While rippling skin may be the primary sign, self-directed aggression, redirected aggression, vocalization, excessive licking, running and soiling may also be signs. Therapeutic response trials might include an SSRI or clomipramine for compulsive disorders, clonazepam for seizure control and reducing arousal and anxiety, gabapentin to help calm, control seizures and treat neuropathic pain, or drugs for pain management.

Treatment of abnormal repetitive behaviors

Behavioral management combined with drug therapy is required for the successful control of most behavioral repetitive disorders. Potential sources of stress should be identified and addressed. Lack of predictability in the daily routine, changes in the pet’s schedule or home environment, unpredictable consequences, lack of sufficient outlets for normal behaviors, and sources of anxiety should all be addressed. The pet should be enhanced enrichment to provide outlets for its behavioral needs (e.g. explore, hunt, scavenge, perch,

scratch), a regular and stimulating daily routine including social play, reward training, and object play to keep the pet positively engaged. Training should reward behaviors that are desirable and prevent or ignore behaviors that are undesirable, and no punishment of undesirable. Interactions with the pet should be structured by teaching sit (say please) before getting anything of value (e.g. treats, toys, play). Predictable interactions give the pet control.

For repetitive behaviors, triggers should be identified so that recurrence of the behavior can be prevented and underlying conflict and frustration resolved. When not actively engaged with the owners (or at rest or sleep) the owners should engage the dog in constructive activities (e.g. food toys, chews). In situations where problems arise, the pet should be taught to engage in alternative desirable behaviors (e.g. sit at greeting). At the onset of any undesirable behavior, the owner should immediately cue the pet into a desirable behavior (e.g. sit, down, come, go to your mat), or leave a leash attached (to a head halter or body harness) to be able to physically prompt the pet into an acceptable outcome.

Medication

Most compulsive disorders should improve substantially with SSRI's such as fluoxetine, sertraline, paroxetine or citalopram or with clomipramine to enhance serotonin transmission (compulsive) and possibly inhibit dopamine activity (stereotypy).¹²⁻¹⁵ After 4-6 weeks, if there is insufficient response higher doses may be needed. Tricyclic antidepressants (TCA) other than clomipramine are not as effective since they are less selective for serotonin reuptake inhibition.

Since altered glutamatergic neurotransmission may be a factor, blocking glutamate sensitive NMDA (N-methyl-D-aspartic acid) memantine or dextromethorphan might be an effective adjunctive therapy.^{5,6} However, due to its short half-life, rapid clearance and variable absorption in dogs, dextromethorphan may not be a reliable treatment. Memantine may be effective alone or combined with fluoxetine.¹⁶ Huperzine A, an extract of club moss also acts as NMDA receptor antagonist, as well as cholinesterase inhibitor and may have anticonvulsant properties. It may therefore have a consideration as an adjunctive therapy for abnormal repetitive disorders. A dose of .05-0.1 microgram/kg 2 to 3 times daily has been reported to be use in dogs with partial seizures.¹⁷

Opioid antagonists such as naltrexone and naloxone have also demonstrated success in reducing stereotypies such as self-traumatic disorders.⁴ For stereotypic behavior, especially self-licking, selegiline may be an effective therapeutic agent with a response of greater than 80% when the response is still regulated by external factors, perhaps due to external reinforcement.²

Drugs such as benzodiazepines, trazodone, or clonidine might be added adjunctively prior to anxiety evoking situations. Natural products might also be used adjunctively to help the pet to calm including pheromones, l-theanine, alpha-casozepine, tryptophan combined with a reduced protein diet, a diet combining alpha-casozepine and tryptophan, melatonin, aromatherapy or perhaps classical music.

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Dementia in Dogs and Cats: How to Identify it and What You Can Do to Improve Pets' Behavioral Health

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Cognitive dysfunction syndrome (CDS) is a neurodegenerative disorder of senior dogs and cats which is characterized by a gradual cognitive decline and increasing brain pathology. The diagnosis is based on clinical signs described by the acronym DISHA; **D**isorientation; altered social **I**nteractions c) altered **S**leep-wake cycles d) **H**ousesoiling and e) **A**ltered activity levels which may be accompanied by an increase in signs of Anxiety.^{1,2}

While a decline in learning and memory may be the most important indicator of cognitive decline, the average pet may appear minimally challenged. Therefore the development and validation of tests in the laboratory (e.g. spatial memory, attention, reversal) for assessing age related decline in different cognitive domains has been instrumental in identifying learning and memory deficits and providing a methodology by which products might be assessed.^{1,3-6} These and other studies have demonstrated memory impairment in dog and cats as early as 6 years of age.⁵

Prevalence

Not all dogs and cats develop CDS. Prevalence ranges as high as 74% have been reported.⁷ In one recent study by Salvin et al., prevalence of CDS in dogs ranged from 5% in dogs 10-12 to 41% in dogs over 14 with an overall prevalence of 14.2%.⁸ In a cat study, 35% had signs consistent with CDS; 28% of 95 cats aged 11 to 15 and 50% of 46 cats over 15.⁹ In addition, both prevalence and severity increase with age with dogs with 40% of dogs with no impairment progressing to mild impairment and 24% of mild impairment progressing to moderate over 6 months.⁷

Behavior signs in senior pets

a) Owner reported signs

The most commonly reported signs in senior pets at behavior referral practices reflect those that are sufficiently problematic to the pet or the owner to seek help. While CDS may be an underlying factor, other neurologic diseases, sensory decline, endocrine and metabolic disorders, musculoskeletal disease and other causes of pain must be ruled out. In a Spanish study by Marrioti et al of 270 dogs over 7 years of age presented for behavior problems, 32% displayed aggression to family members, 16% aggression to family dogs, 9% barking, 8% separation anxiety, 6% disorientation and aggression towards unfamiliar people, 5% housesoiling, 4% destructive and compulsive disorders and 3% noise fears. Of 83 cats referred for behavioral consultations most cats presented with marking or soiling (73%), followed by aggression (16%), vocalization (6%) and restlessness (6%).¹

b) Cognitive decline and dysfunction

As signs of cognitive decline may initially be subtle and pet owners unaware that treatment options are available, many cases go unreported until the signs become problematic for the owners, or a welfare issue for the pet. However, early detection allows for early intervention so that further decline might be slowed and behavioral signs improved. Yet most cases go unreported.⁸ Therefore veterinarians must be proactive in questioning owners for signs. In dogs 8 years and older, activity and play levels, response to commands, and fears and phobias deteriorated most, although medical causes were a possible cause.¹¹ In another study of dogs over 8, the most common signs of CDS were sleeping more during the day and restless at night (57%), altered social interactions (51%), disorientation (49%) and anxiety (46%).² For dogs with mild cognitive dysfunction, the predominant sign was daytime sleep (70%) with anxiety in 11% of dogs while anxiety in the non-cognitive dysfunction dogs was 4%. The most commonly reported sign in cats 10-13 was altered social interactions while for cats 15 and over, alterations in activity including aimless activity and vocalization were most common.^{1,9}

Diagnosis of CDs

When signs of CDS are identified, a diagnostic workup is necessary to rule out medical, physical and motor dysfunction as a cause of the signs. Next to neurological disease, sensory decline, endocrine and metabolic disorders and musculoskeletal disease are the primary rule-outs. Questionnaires can be particularly useful for identifying signs but there is minimal validation and physical conditions can cause many of these signs.^{7,11-13} However, by screening each pet with a broad based questionnaire for signs that have appeared or worsened since 8 years of age (or compared to 6 months previously), pets will be identified for further assessment as to whether the signs are physical or cognitive. Behavioral changes correlated with brain aging include activity which may initially decline but progress to increased activity, restlessness and aimless behavior.¹⁴

Aging and its effect on the brain

In dogs, with increasing age frontal lobe volume decreases, ventricular size increases and there is meningeal calcification, demyelination, a reduction in neurons and an increase in toxic free radicals.^{1,6,15} In cats, there is also neuron loss, increased ventricular size, cerebral atrophy and widening of sulci although not as marked as dogs.^{9,16} Circulatory changes in dogs and cats including microhemorrhage and infarcts may also be responsible for signs of CDS. A decline in the cholinergic system has also been identified which may contribute to declining cognitive and motor function. In dogs, cats and humans there is an accumulation of diffuse beta amyloid plaques and perivascular infiltrates with increased A β associated cognitive impairment.^{1,6,17,18} The most striking difference from humans is the absence of senile plaques in dogs and cats although hyperphosphorylated tau is reported as well as have neurofibrillary tangles in cats.^{9,16,18}

Environmental management and cognitive enrichment

When cognition is impaired, diet, drugs or supplements might be useful in improving signs and slowing the progress of CDS. Canine studies have demonstrated that mental stimulation in the form of training, play, exercise and manipulation toys can help to maintain quality of life as well as cognitive function.¹⁹

Medical and nutritional therapy

Selegiline is a monoamine oxidase B inhibitor which has demonstrated efficacy in improving cognitive signs. It has been shown to increase 2-phenylethylamine in the dog brain, a neuromodulator that enhances dopamine and other catecholamines in the cortex and hippocampus. It may also contribute to a decrease in free radical load through decreased production and increased clearance. Dose is 0.5 – 1.0 mg/kg daily

Since the elderly are particularly susceptible to the effects of anticholinergic drugs, it is prudent to avoid drugs with anticholinergic effects. In fact, drugs or natural products that enhance cholinergic transmission might have potential benefits for improving signs of CDS in dogs and cats. Propentofylline, a xanthine derivative is licensed for lethargy and depressed demeanour in old dogs in some countries but not in North America. It may increase blood flow and inhibit platelet aggregation and thrombus formation. Other treatment strategies include nicergoline an alpha 1 and alpha 2 agonist and the NMDA antagonist memantine. No drugs are approved for cats; however, selegiline and propentofylline may be useful.

A primary therapeutic strategy for cognitive dysfunction in dogs, cats and humans is to reduce the risk factors that contribute to cognitive decline. It is likely that an integrative approach is required. In dogs, a senior diet (Canine b/d, Hills Pet Nutrition) has been shown to improve signs and slow the progress of cognitive decline. It is supplemented with fatty acids, antioxidants (vitamins C and E, beta carotene, selenium, flavonoids, carotenoids), and dl-alpha-lipoic diet and l-carnitine to enhance mitochondrial function.^{5,19} The combined effect of the diet plus an enriched environment provided the greatest improvement.¹⁹ However, while enrichment resulted in improvement in cognitive function, the dietary therapy resulted in a reduction in reactive oxygen species and in beta-amyloid accumulation.⁵

A Purina Veterinary Diet (Essential Care Senior, Pro Plan Bright Minds), supplemented with botanic oils containing medium chain triglycerides provides ketone bodies as an alternate source of energy for aging neurons, has also been shown to significantly improve CDS in dogs.²⁰ For cats, a diet (not commercially available) developed by Nestle Purina supplemented with antioxidants (Vitamins E and C and Selenium), arginine, B vitamins and fish improved learning and memory tasks compared to a control diet in cats 5.5-8.7 years.³

Senilife® (CEVA Animal Health), has demonstrated efficacy in improving cognition in both a laboratory model and clinical studies in dogs. It contains phosphatidylserine, a membrane phospholipid as well as Gingko biloba, vitamins E and B6 and resveratrol. Another product with phosphatidylserine, omega-3 fatty acids, vitamins E and C, l-carnitine, alpha-lipoic acid, coenzyme Q and selenium is available in the UK.²¹ There is also a cat product with no alpha-lipoic acid.

S-adenosyl-l-methionine (Novifit®, Virbac) may help to maintain cell membrane fluidity and receptor function, regulate neurotransmitter levels and increase glutathione production. Improvement has been demonstrated in dogs in a placebo controlled trial and in laboratory studies in dogs and cats.^{4,22}

Apoaequorin (Neutricks™) is a protein found in jellyfish that in laboratory trials improved learning and attention in dogs. It is a calcium buffering protein that may provide neuroprotection against aging.²³

Behavior modification and adjunctive medications

Together with diets, supplements and drugs for the treatment for CDS, psychotropic medications may be required to manage underlying stress and address those signs such as night waking, agitation and anxiety that continue to be problematic for the owner and pet. Clinical signs may persist even if CDS and underlying anxiety and stress have been effectively addressed. Therefore concurrent environmental management and behavior modification are also likely to be needed.

Since anticholinergic drugs should be avoided, SSRI's or buspirone might be preferred options for ongoing use. Trazodone might also be considered either alone or in combination with an ongoing SSRI or buspirone. However, drugs that increase serotonin, should

not be used concurrently with selegiline. While benzodiazepines could contribute to further cognitive deficits, they may be useful in managing signs of anxiety and sleep disturbances. Lorazepam, clonazepam, and oxazepam are preferred since they have no active intermediate metabolites. Adjunctive use of propranolol or clonidine may reduce some of the noradrenergic effects contributing to the signs of anxiety. Gabapentin might reduce reactivity and neuropathic pain. Natural products might also aid in the control of anxiety.

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Stress: Its Effect on Pet Health and Behavior

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The stress response

The stress response is caused by physical and emotional factors that trigger behavioral, psychological, endocrine and immune effects. In the acute response, the autonomic nervous system, HPA axis, and cardiovascular, metabolic and immune systems work together to manage stress and return the pet to homeostasis.

A principle component of the stress response is the release of corticotrophic releasing factor from the hypothalamus which stimulates the release of ACTH leading to an increase in cortisol. Cortisol stimulates gluconeogenesis, a reduction in inflammation, suppression of immune function, and decreased gastrointestinal motility. Behaviorally cortisol is associated with a passive strategy, loss of control, and may also increase sensitivity to aversive events.^{1,2} In one study, dogs on glucocorticoids were significantly less playful, more nervous/restless, more fearful/less confident, more food aggressive, more prone to bark, startle, and react aggressively when disturbed and avoid people or unusual situations.³

The second component is the sympathetic-adrenal-medullary (SAM) system which releases noradrenaline and adrenaline to handle the threat (fight or flight) resulting in an increase in cardiovascular tone with increased blood pressure, heart rate, and respiratory rate, contraction of the spleen leading to an increase in PCV, anti-diuresis, and increased blood flow to skeletal muscles. Noradrenaline also has behavioral effects including arousal, alertness, sensitization and fear conditioning.¹

A third component is the lactotropic axis, prolactin and oxytocin. Prolactin which is suppressed by dopamine, decreases in response to acute stress.⁴ B-endorphin and vasopressin are also associated with stress. In one study cortisol, progesterone, beta-endorphin, vasopressin, heart rate and haematocrit were all increased during and after gunshots in the fearful dogs compared to the fearless dogs.¹

While the stress response is an adaptive mechanism, recurrent and chronic stress may lead to dysregulation and an inability to return to homeostasis, as a result of ongoing stimulation of the HPA axis, catecholamine system and other mediators such as excitatory amino acids and brain derived neurotrophic factor (BDNF). The ability to adapt to repeated stress varies with early experience, previous experience, genetics, physical health, environment, diet, enrichment and the stressor itself. Stressed animals may have higher levels of plasma 5HT and dopamine compared to controls.⁵ Increases in dopamine may enhance aggressive behavior and lead to an increase in grooming and stereotypic behaviors. In one canine study, generalized anxiety with autonomic signs, fear aggression, displacement behaviors and stereotypies was associated with an increase in prolactin, but not in dogs with acute fears and mild phobias.⁶ As dopamine has a suppressive effect on prolactin, dogs with high prolactin were improved with selegiline. On the other hand dogs with lower prolactin levels were improved with fluoxetine. Elevated cortisol levels in aggressive dogs compared to non-aggressive dogs, may indicate a relationship between aggression and stress⁷

Stress and physical health

In humans there may be a correlation between stress and poor immune function, cardiovascular disease, skin disease, asthma, gastrointestinal disorders, and cellular aging. Similarly in pets, stress may alter immune function, reduce reproductive success and contribute to gastrointestinal, dermatologic, respiratory, urologic, reproductive and cardiac conditions, behavioral disorders and a shortened lifespan.⁸ In recent studies of environmental stressors in colony cats, sickness behaviors associated with the gastrointestinal tract and behavior problems including avoidance behaviors and soiling in both cats with FIC and control cats.^{9,10} In addition, grooming may increase following acute stressors in cats.¹¹ Feline respiratory disease and weight loss has also been demonstrated to be associated with increased environmental stress in shelter cats.¹² When comparing shelter housing, cats provided with enriched housing when first admitted to the shelter including an added shelf with a towel draped to allow for hiding, plus additional toys and consistent handling and social interactions, had lower stress scores, were adopted sooner, and had less illness (26% to 12%).¹³

Cats with feline interstitial cystitis (FIC) have altered bladder permeability during stress when compared to cats in an enriched environment.¹⁴ An increase in plasma noradrenaline has been demonstrated in cats with interstitial cystitis. Cats with FIC that received MEMO (multimodal environmental modification) had a significant reduction in FIC, respiratory disease, fearfulness, and nervousness and less inflammatory bowel disease and aggression.¹⁵ In one study there were less bouts of FIC when a Feliway™ diffuser was installed. Behavioral risk factors for FIC might include moving house, movement blocked by other cats, living with dogs, or living with another cat with which there is conflict.^{16,17} In a recent study comparing urine spraying and cats that were not using the litter box, both the behavioral normal and problem cats in the spraying household had elevated glucocorticoids but not the cats in the household where there was a failure to use the litter tray.¹⁸

Stress and anxiety can alter bacterial flora, inhibit gastric emptying, increase colonic activity, and increase intestinal permeability leading to irritable bowel syndrome, inflammatory bowel disease, gastrointestinal reflux, and heartburn. In pets, acute fear and anxiety can lead to a decrease in appetite or anorexia, diarrhoea, vomiting or colitis. Pica, polyphagia, and polydipsia may also be stress induced. With obesity in pets ranging from 25 to 45%, and with indoor lifestyle and level of physical activity identified as risk factors, it has been suggested that stress (in particular negative emotions) may stimulate eating, perhaps in part due to glucocorticoid effects.¹⁹

Stress can affect reproductive health by decreasing sperm quality, inhibiting sexual interest, erection and ejaculation in males and inhibiting ovulation and decreasing fertility in females.²

Although the immune response associated with stress is intended to enhance defence mechanisms, in some individuals stress may contribute to inflammatory dermatoses, including atopic dermatitis, psoriasis, and urticarial.²⁰ In humans with atopic disease stress may lead to increased levels of IgE and eosinophils and an over-reactive sympathetic adreno-medullary system, and increased epidermal permeability.²¹ A similar response in pets might exacerbate atopic disease.²² In one study of dogs with recurrent pyoderma, psychogenic factors were identified.²³ In addition, dogs with non-social fear and separation anxiety had increased severity and frequency of skin disorders.⁸

With increasing age there is an increase in tissue hypoxia, alteration in cell membranes, increased production and decreased clearance of free radicals, a decline in organ, sensory, immune and mental function. These changes may reduce the pet's ability to respond to stressful events, resulting in increased susceptibility to tumours, disease, and behavior problems.

Stress and behavioral health

Chronic anxiety and stress may lead to behavioral disorders in humans including panic, post-traumatic stress, generalized anxiety, obsessive-compulsive, and impulse control disorders as well as anxiety, social, and other phobias which may all have animal correlates. When pets are in conflict (competing motivations), frustrated (where the pet is unable to achieve its goals) or when the behavioral needs of the pet are not adequately addressed, displacement behaviors such as self-trauma, spinning, tail chasing or hyperesthesia might be exhibited. These signs are more likely to arise in pets that are anxious or reactive. Behaviors that arise in response to a specific stimulus might be resolved if inciting factors can be avoided, owner responses are consistent and predictable and alternative acceptable behaviors are rewarded. Pet owners may further aggravate the problem if they reinforce, punish or are inconsistent.

Repetitive behaviors in companion animals have been referred to as compulsive, obsessive-compulsive, and stereotypies. Hallucinatory stereotypies such as snapping at the air, looking upward and circling have been described in the French literature as a sign of dissociative syndrome. Repetitive behaviors may also arise in hyperactivity disorders. Since these repetitive behaviors may be a heterogeneous group of conditions with different pathogenesis, the term abnormal repetitive behavior (ARB) might better describe the clinical presentation until a clear diagnosis can be made. In addition the presentation and pathology may change over the course of the disease (chronicity). Although genetics likely plays a significant role, stress (including maternal deprivation, unpredictability, conflict, goal frustration or the lack of outlets to engage in normal species typical behaviors) appears to be a primary contributing factor. (See notes on repetitive disorders)

Stress prevention and management

Preventing, minimizing, managing and resolving stress is essential for maintaining both behavioral and medical health and welfare. Prenatal, perinatal and post-natal stressors can have a profound effect on learning, memory, reactivity, and fear conditioning. While mild prenatal stress, early handling, and good maternal care produce more resilient offspring with lower HPA axis activation in response to stress and improved task learning, prenatal stress, maternal malnourishment or maternal deprivation, cause delays in brain and physical development, hyper-reactivity, increased fear and aggression, decreased learning ability and a sensitizing effect.

The primary sensitive (socialization) period is a critical time for establishing healthy social relationships with animals and people and reducing environmental fear through exposure to a broad range of stimuli with each of the senses. Puppy classes beginning during the sensitive period (12 -14 weeks) and kitten kindy ideally beginning before the end of the sensitive period (7 to 9 weeks) can be a valuable and productive way to make positive associations with varied social and inanimate stimuli, improve training skills, and address emerging problems.

Animals kept in a restricted environment may not have adequate opportunity to engage in their full behavior repertoire. To effectively address the pet's emotional and behavioral well-being and prevent conflict and frustration the focus should be on providing the pet with i) predictability and control ii) enrichment that provides outlets for all behavioral needs iii) a safe haven and iv) reward based learning.

- Allowing the pet control to choose activities in which it wants to engage and avoid those it does not, prevents the stress that might arise if the pet were forced into interactions or housing that are undesirable. Therefore it is essential to set up the environment to encourage the pet to make choices (where to climb and perch, chew, scratch, sleep; how to greet)

that are acceptable to the pet and owner. All rewards should be given predictably (i.e. structured interaction training, doggy please) where anything of value (i.e. affection, toys, food) is only given for sit. Predictability gives the pet control by learning what behaviors get rewards.

- Enrichment should provide the pet with opportunities to meet its behavioral needs and normal daily time budget. This should include social activities including reward training and play that is appropriate for the species and breed (e.g. retrieving, herding, tug games, predatory play), other interspecific or intraspecific social play, object play including chews and feeding toys and opportunities to explore, chew, scavenge, hunt, climb, perch, scratch and eliminate.
- To insure comfort, safety and control for the pet while preventing behaviors that are undesirable, the pet should have a safe haven for housing i.e. a conditioned place of safety outside of times when there are stressors.¹² Use of the safe haven can be encouraged by leaving treats, toys or chews in the area, rewarding entry (e.g. clicker training) and placing on cue. The location should be one in which the pet feels comfortable sleeping or spending time on its own. When in its safe haven the pet should never have attention forced upon it, or be forced to leave the area.²
- Learning should be a reward based process to increase behaviors that are desirable, NOT punish behaviors that are undesirable. Training that provides the pet with control can add to the pet's enrichment. Consistency, timing and repetition is necessary for learning. Clicker training can be particularly effective for shaping and immediate timing.
- Medications might be considered as prevention or treatment for potentially stressful situations. Dog appeasing pheromone might help ease the introduction of puppies into their new homes. Puppies enrolled in puppy socialization classes that wore pheromone collars were less fearful and more social than dogs with placebo collars, while puppies introduced into new homes adapted more quickly and were less stressed in novel situations. Feliway may also help to reduce stress and facilitate introduction of kittens into the new home or at times of stress and change. Other products that might calm include L-theanine, tryptophan in combination with a reduced protein diet, alpha-casozepine, a diet combining alpha-casozepine and tryptophan, and perhaps aromatherapy or music therapy. Before a known stressful event, drugs such as benzodiazepines, clonidine or trazodone might be used on an as needed basis, or clomipramine, fluoxetine or buspirone on an ongoing basis

Resources

AAFP and ISFM feline environmental needs guidelines: <http://bit.ly/14uWTCB>.
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