**Understanding Behavior**

**Column Editor**

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About This Column

Behavior problems are a significant cause of death (euthanasia) in companion animals. While most veterinary practices are necessarily geared toward the medical aspect of care, there are many opportunities to bring behavior awareness into the clinic for the benefit of the pet, the owner, and ourselves. This column acknowledges the importance of behavior as part of veterinary medicine and speaks practically about using it effectively in daily practice.

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**Cognitive Dysfunction in Senior Pets**

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Continuous improvement in the veterinary care of aging pets and the increasing social acceptance of pets as members of the family have led to a steadily growing population of geriatric pets. As a result, the need to understand and address behavioral issues that arise with senior pets is increasing. Cognitive dysfunction (CD) in dogs and cats, similar to Alzheimer’s disease in humans, can cause behavior changes secondary to declines in mental function that are not directly observable. Although there is no cure for CD, medication and changes in diet can slow its progress, while owner education in appropriate environmental management and behavior modification can improve the quality and prolong the duration of life for geriatric pets with this disorder.

**PATHOPHYSIOLOGY**

Memory, learning, and awareness of the environment are all internal processes. Only through their manifestation in observable behavioral changes can the changes that are taking place in the brain be realized. Several pathophysiologic changes occur in the brains of animals with CD, some of which are visible during postmortem examination. For example, brain mass and cell numbers progressively decrease, while ventricle size increases. Simultaneously, the meninges fibrose and the white matter degenerates. In dogs, β-amyloid plaques, which interfere with conduction, accumulate in the cerebral cortex and the hippocampus. Changes include alterations in the activity of various neurotransmitters, including serotonin, dopamine, acetylcholine, and norepinephrine.

**DIAGNOSIS**

Currently, there is no test that is diagnostic for CD. Instead, clinicians must evaluate owner observations of changes in behavior and rule out other possible causes for these changes. Ultimately, the diagnosis is one of exclusion, combined with a behavioral history that is consistent with CD. Changes in behavior may occur suddenly but are usually gradual in onset. It can be helpful to have a set of behavior-related questions that is asked at all senior pet visits, ideally starting by the time the pet is 6 or 7 years of age (see the box on page 107). For giant-breed dogs, the survey should be initiated a year or two earlier. Over time, the answers to the survey questions establish a baseline of the pet’s normal adult behavior. Changes in behavior can then be evaluated against this baseline and used to help make a diagnosis of CD. For example, if a pet is aggressive toward specific individuals for several years, continued aggression toward those individuals is not a consequence of CD, but aggression toward individuals with whom the pet has previously been friendly may be due to CD.

Behavioral changes typically fall into several broad categories, including changes in activity, sleep, appetite, and social interaction. In addition, the pet may exhibit disorientation and loss of previous learning, such as housetraining and obedience commands. Most adult pets that live in a stable family situation develop a routine of activity pat-
terns. They get up at about the same time every day, usually in response to household stimuli such as the family awakening, then proceed to eat, play, exercise, and rest in a fairly predictable fashion. Owners of geriatric pets with CD may notice alterations in this routine. The pet may play or otherwise self-exercise less. Alternatively, it may begin spending significant amounts of time pacing or wandering around the house. While total sleep increases, nighttime wakefulness may become a problem, with the pet arising repeatedly, wandering around, making noises, vocalizing, and otherwise disrupting the household’s sleep patterns. The pet’s interest in food may increase or decrease, or the pet may begin to avoid foods it once preferred and eat items it used to not eat. Changes in eating behavior can include pica (the consumption of nonfood items).

Changes in social interactions and learning are often among the first changes that owners notice. A pet that once exhibited a friendly greeting when someone returned to the household may now seem oblivious to the comings and goings of household members. Alternatively, failing to recognize family members, the pet may become aggressive to them when they return, treating them as strangers invading the home. Social interactions that were once common, such as responding to a human’s or other pet’s attempts to play, may be met with an apparent lack of interest. Sometimes, the family members incorrectly assume that the pet is simply tired or “slowing down” due to old age. In other cases, especially among owners who are aware of the body language of their pet, family members may think that something is wrong but cannot specifically identify anything. They may say that the pet simply “doesn’t look the same.” In extreme cases, staring off into space, combined with a total failure to respond to visual or auditory cues exhibited by family members, makes the progressive loss of awareness obvious. In the area of discrete learning, loss of housetraining or litterbox training may result in elimination in the house. The pet may also exhibit a decreasing response, or even a total lack of response, to verbal cues it once obeyed readily, such as “sit,” “down,” “roll over,” or “shake.”

Because most dog owners have carried out some degree of obedience training with their pet over the course of its life, whereas many cat owners do not engage in such interactions, dog owners are more likely to notice the changes consistent with CD in their pet. However, cats also develop CD. Cat owners who have not trained their pet to respond to verbal cues are more likely to notice changes in social interaction or elimination habits. Therefore, routine survey questions asked at geriatric cat visits should focus on the interactions in which owners are more likely to notice changes.

**TREATMENT**

Once CD has been diagnosed, treatment is multi-pronged. First, owners who are frustrated or angry with the behavioral changes must be educated as to their cause. Because of the prevalence of Alzheimer’s disease in the human population, most people are familiar with it. Therefore, explaining that CD is similar facilitates understanding.

**Medication**

While several medications have been developed to treat human Alzheimer’s disease, to date, only selegiline (L-deprenyl, Anipryl; Pfizer) has been FDA approved for CD, and only in dogs. Although it is not approved for use in cats, it has been used effectively in cats. Selegiline is an irreversible inhibitor of monoamine oxidase (MAO). The two main monoamine oxidases are MAO-A and MAO-B. Both, but primarily MAO-B, catabolize the oxidative deamination of various catecholamines, particularly dopamine, norepinephrine, epinephrine, β-phenylethylamine, and serotonin. Both, but primarily MAO-A, also catabolize exogenous amines that derive from various foods and drugs, resulting in a significant effect on the digestive tract and liver. Selegi-

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**Sample Questions for Clients Regarding the Behavior of Pregeriatric and Geriatric Pets**

- How much does your pet play? What types of games does he/she play? Has he/she recently changed the way he/she plays?
- What commands or signals does your pet know? How well does he/she respond? Have there been any recent changes in your pet’s response?
- Approximately how many hours does your pet sleep within 24 hours? Does he/she sleep well at night? Does he/she vocalize at night? Have there been any recent changes in your pet’s sleep behavior?
- How does your pet interact with various family members? Have there been any recent changes?
- Does your pet ever pace, wander in an apparently aimless fashion, or appear to be staring into space?
- Does your pet ever eliminate inside the house (dogs) or outside the litterbox (cats)? Has there been a recent change in your pet’s elimination behavior?
line has a greater affinity for MAO-B than for MAO-A and, at clinical doses, has almost no effect on MAO-A. The initial recommended dose is 0.5 mg/kg/day, given in the morning. The onset of efficacy is gradual, taking place over several weeks. Therefore, unless adverse effects occur, the patient should be maintained on the starting dose for 1 month before the clinician decides whether the medication and the dose are beneficial. If improvement after 1 month is insufficient, the dose can be increased up to 1.0 mg/kg/day.

Selegiline should not be given in combination with selective serotonin reuptake inhibitors (SSRIs) or tricyclic antidepressants (TCAs). Geriatric pets that are suspected of having CD may exhibit significant signs of anxiety. In some cases, it may be unclear whether the problem is CD or geriatric onset of an anxiety disorder. Therefore, it is necessary to plan ahead for potential changes in medication resulting from a lack of response to an initial medication. Because MAO inhibitors, TCAs, and SSRIs all have long half-lives, switching between them requires a washout period. When selegiline is discontinued to begin administration of a TCA or an SSRI, a minimum of 2 weeks without medication is required; 5 weeks without medication is needed when changing from most SSRIs and TCAs to selegiline. Because selegiline also has anxiolytic effects and there is a shorter washout period when changing from selegiline to a TCA or an SSRI, if a clinician is unsure whether the problem is CD or an anxiety disorder, it is generally best to begin treatment with selegiline.

Diet

Feeding an appropriate diet is also important in slowing the progression of CD. A diet (e.g., Hill’s Prescription Diet b/d) that is rich in antioxidants may support the maintenance of mental acuity in aging dogs. Geriatric dogs have been shown to have better learning ability and increased alertness compared with controls when on such a diet. Therefore, such diets are beneficial for aging dogs that do not require another therapeutic diet (e.g., for kidney failure), even if they do not have CD. Comparable research on the maintenance of learning ability has not been published for cats; however, feline diets that are likewise rich in antioxidants may provide a similar beneficial effect.

Environmental and Behavior Modification

Environmental management and behavior modification can help both the pet and the owner maintain a good quality of life. For cats that are eliminating in inappropriate places because they are forgetting to go to the litterbox or cannot remember where the box is, taking them to the litterbox regularly may be beneficial because the various stimuli of the box may trigger elimination behavior. If the litterbox is in a hidden area, simply placing it next to where the cat spends most of its time may be sufficient. With this approach, when the cat wakes up from a nap, the litterbox is immediately available, and it does not have to remember a route to the box. The elimination habits of geriatric cats can often benefit from the owner providing litterboxes on all floors of the house that are accessible to the cat. Also, because older cats may have decreased vision, a night light beside the litterbox can be a helpful guide. For a dog that eliminates in the house, treating it as if it were a puppy can be a useful approach. The dog should be taken outside frequently and praised profusely when it eliminates outside. Owners often discontinue praise of appropriate elimination in adult dogs that are well house-trained. Therefore, it is important to explain to them that they need to reinitiate this practice with their elderly dog.

Positive reinforcement, not punishment, should be used during training attempts. In the best-case scenario, positive reinforcement facilitates learning and maintains the human–pet bond. At worst, if the pet does not accomplish the desired learning, it has a pleasant interaction with its owner. If punishment is used and the pet does not learn because it is not capable of learning, the undesirable interaction will only further stress an animal that is already having difficulty coping with its environment. Owners should be advised to avoid making major changes in the pet’s home environment (e.g., redecorat-
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Although elderly pets tend to sleep more and exercise less, it is important for them to maintain a moderate level of exercise. The veterinarian should discuss the pet’s stamina and opportunities for exercise with the owner to ensure that the owner continues to provide a level of exercise suitable for the pet. Likewise, mental stimulation is important to help maintain mental acuity as long as possible. Owners should not give up on providing a moderately stimulating environment, new toys or games, or training. Regular training, using positive reinforcement of desired behavior and ignoring undesired responses, stimulates mental activity and helps continue the human–pet bond. If the animal’s sensory acuity is fading (e.g., decreased hearing or vision) or its awareness of sensory input is decreasing because of CD, it may be necessary to develop new stimuli. For a dog that is going deaf, hand signals can replace verbal signals. For a dog with CD that has decreased awareness of its environment, consistently using a clear signal, such as a brief whistle, before giving a verbal command can alert the animal to focus its attention on the command. If the dog responds to the command as desired, it should be given a treat. Even for cats and dogs that have not been trained to respond to commands, preceding attempts at social interaction with strong stimuli (e.g., petting) may be useful in getting their attention.

In addition to specifically addressing issues of learning and memory, owners of geriatric pets should consider how to accommodate other changes that are likely to be occurring in their pet’s health. If the pet has difficulty walking because of arthritis or other musculoskeletal conditions, the owner may wish to provide nonskid surfaces for walking and ramps for going in and out of the house. However, ramps are sometimes not practical for the stairs between stories of a house. In this case, small pets can be carried up and down the stairs—for example, carried upstairs when the family retires for the night and downstairs in the morning (if the family spends most of the daytime on the ground floor). If a large dog has difficulty negotiating stairs, it may be necessary to develop resources and new routines that keep the dog on one level of the house. If the dog’s sleeping area, including its bed, has historically been in the owner’s bedroom, it can be useful to move the bed downstairs and develop a routine of “putting the dog to bed” there, then waiting until it has fallen asleep before departing. In all cases, the family’s specific routines and living situation, as well as the needs of the pet, must be considered when developing a plan for modifying living arrangements.

REFERENCES