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Topic Overview

Cognitive dysfunction syndrome (CDS) is one of the most underdiagnosed conditions in dogs and cats. Diagnosis of this condition is typically a diagnosis of exclusion. The earlier CDS is identified and interventions are implemented, the sooner disease progression can be delayed, helping maintain the human–animal bond. Treatment may involve pharmaceuticals, change in diet, nutritional supplements, environmental modifications, and enrichment and exercise.

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BEHAVIOR

Updates on Cognitive Dysfunction Syndrome

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Aging is a normal progression of life. Aging can be considered normal when it occurs in the absence of disease, or if a concurrent disease has minimal impact on the pet's quality of life.[1] A normally aging pet may exhibit physical and cognitive changes that correspond to its age, but it can maintain its normal daily functions relatively easily. According to Salvin et al, successful aging occurs at a rate at which cognitive deterioration does not affect the day-to-day function of the individual.[2]

In the normal aging process, it is not uncommon for pets to develop changes in eating habits; periodontal disease; musculoskeletal degeneration; decreased activity; and, as a result, a perceived decrease in interest in social bonds with family members.[2,3]

The term cognitive dysfunction syndrome (CDS) applies when a pet's cognitive abilities, such as executive function, attention, and memory, have deteriorated to a point where the pet's daily life is negatively affected and the pet is in a state of negative wellbeing. Age is a risk factor that affects the prevalence and severity of cognitive decline.

CLINICAL SIGNS

Pets with CDS exhibit changes in memory, learning ability, perception, spatial awareness, sleeping pattern, and social interactions with people and other animals. This set of changes—disorientation, social interactions, sleep–wake cycle changes, house-soiling issues, and changes in activity and anxiety—was previously summarized by the acronym DISHAA. Loss of learned behaviors and, for cats, increased vocalization have since been added, resulting in the acronyms and clinical signs listed in **TABLE 1**.

ASSOCIATED BRAIN CHANGES

CDS in dogs and cats has similarities to Alzheimer disease in humans. People with Alzheimer disease have physical changes in their brain, including plaques consisting of amyloid β (Aβ) and hyperphosphorylated tau protein,

Learning Objectives

- The earlier cognitive dysfunction syndrome (CDS) is diagnosed, the sooner treatment can be started to slow its progression.
- The use of medications, prescription diets, and/or nutritional supplements may help reduce clinical signs of CDS.
- CDS is a diagnosis made by exclusion of other diseases.

TABLE 1 Current Acronyms and Clinical Signs of Cognitive Dysfunction Syndrome[4]

ACRONYM	CLINICAL SIGNS
DOGS	
D	**D**isorientation
I	Changes in **i**nteractions
S	Changes in **S**leep–wake cycle
H	**H**ouse soiling
A	Changes in **A**ctivity levels
A	**A**nxiety
L	**L**earning and memory
CATS	
V	**V**ocalizations
I	Changes in **i**nteractions
S	Changes in **S**leep–wake cycle
H	**H**ouse soiling
D	**D**isorientation
A	Changes in **A**ctivity levels
A	**A**nxiety
L	**L**earning and memory

neurofibrillary tangles, and neuronal loss.[5] Aβ plaques are neurotoxic and interfere with nerve conduction.[6] The severity of cognitive decline is correlated with extent of Aβ deposition. Other changes include ventricle dilation, decreased brain size/mass, decreased blood flow, meningial fibrosis, white matter degeneration, decreased cellular number, changes in glial cells, and neuroaxonal degeneration. Changes in neurotransmitter (dopamine, serotonin, norepinephrine and acetylcholine) level and activity are also seen.

Potential causes for neurodegeneration in cats are hypoxia, oxidative damage, and decreased cerebrovascular blood flow due to vascular insuffiency.[7] Brain changes noted in aging cats include atrophy, neuronal loss, vascular and perivascular changes, Aβ deposits, and tau hyperphosphorylation. Although cats do not form neuritic plaques, diffuse Aβ deposits in the entorhinal cortex may account for the dysfunction noted in cats.[6] The extent of Aβ deposits does not appear to be correlated with the severity of CDS in cats.[7]

ASSOCIATION WITH PHYSICAL CHANGES

One study found that a dog's cognitive status had a strong positive correlation with musculoskeletal–neurological factors and overall health score.[8] Participants filled out questionnaires with 17 items covering disorientation, sleep–wake cycles, social interactions, learning and memory, activity level, and anxiety, as well as questions about their dog's general health and diagnoses made by their veterinarian. The musculoskeletal–neurological score was higher in normally aging dogs than in dogs diagnosed with cognitive impairment. The findings of this particular study shed light on the possibility that disease processes in pets may affect the development of CDS, although the authors note the potential for signs of musculoskeletal–neurological disease to be mistaken for signs of cognitive decline.

Hearing loss is a risk factor for dementia in humans, and decreases in olfaction and sight in humans have been associated with cognitive decline.[8] Similarly, 1 study found that hearing loss was associated with severity of CDS in dogs.[9] In dogs, hearing loss can occur around 8 to 10 years of age, and affected dogs have difficulty hearing middle to high frequencies as opposed to low frequencies. Pet owners have reported changes in interactions with their dogs and a perceived lower quality of life for the dog.[9] In another study, visual impairment, tremor, head ptosis, and changes in olfaction and stability (swaying or falling) were significantly associated with CDS in dogs.[10]

Results from the Dog Aging Project have supported the association between age and CDS in dogs.[11] The study also found strong positive associations between higher scores on its CDS scale and history of a neurologic, ear, or eye disorder as well as decreased physical activity level.

PREVALENCE

CDS in dogs and cats is often overlooked and underdiagnosed. Various studies that used pet owner interviews have revealed that the prevalence of CDS in dogs ranges from 22.5% to 73.5%.[2] A survey of owners of dogs aged 7 years or older revealed that 75% of the dogs had at least 1 behavioral change indicative of CDS, but only 12% of owners had reported the behavior change to their veterinarian.[12] In a 2010 study, the estimated prevalence of canine CDS was 14.2%, but the veterinary diagnosis rate was only 1.9%.[13]

A survey conducted on a group of randomly chosen dogs aged between 11 and 16 years (97 spayed female,

83 castrated male dogs) found that 28% (22/80) of 11- to 12-year-old dogs demonstrated impairment in 1 or more of 4 categories: orientation, social interactions, housetraining, and sleep–wake cycle.[14] In this group of 11- to 12-year-old dogs, 10% (8/80) of the dogs had impairment in 2 or more behavioral categories. In the group of 15- to 16-year-old dogs, 68% (23/24) of the dogs had impairment in 1 or more behavioral categories. In this particular subset, 35% (12/34) of the dogs had impairments in 2 or more categories.

A 2024 study comparing CDS screening questionnaires had a diagnosis rate of 15%, but the screening questionnaires indicated that one-third of the dogs in the study exhibited signs of cognitive decline.[15]

Size and breed are not indicative for the development of CDS in dogs.[13] Conflicting studies report no sex difference, but Neilson et al found that neutered males were significantly more likely to have cognitive impairment in orientation.[14]

A study in cats noted that 28% of cats between 11 and 14 years of age had alterations in social interactions.[16] In this study, 50% of cats older than 15 years exhibited aimless activity and excessive vocalization. Another study found that the onset of cognitive changes is commonly noted in cats older than 10 years.[7] However, some neuropathological changes, such as neuronal loss and reduced number of synapses in the caudate nucleus, have been noted in cats as early as 6 to 8 years of age.[13] These changes were not associated with any signs of cognitive decline.[7]

IMPACT ON THE HUMAN–ANIMAL BOND

Common behaviors reported by owners of pets with CDS are listed in **BOX 1**. Some of these behaviors may also be signs of other diseases or of changes associated with normal aging. For example, a pet that is less responsive to verbal cues may have hearing loss; therefore, it is important to determine whether sensory deficits are the primary problem. The most distressing behaviors are those that disrupt the sleep–wake cycle. Any disturbance in sleep is intolerable to most people.

CDS decreases the quality of the pet's daily life because the pet may have difficulty adapting to changes in the environment or family schedule; may be disoriented in familiar surroundings, which may increase anxiety; and may have difficulty recognizing family members with whom it has an established relationship. Without early intervention, the decline in the pet's quality of life will contribute to caregiver burden, which in turn affects the caregiver's quality of life.

Many pet owners do not report their pets' cognitive changes to their veterinarian because they assume their pet's condition is part of the normal aging process. More client education is needed to help distinguish between normal and abnormal signs of aging.

BOX 1 Cognitive Dysfunction Syndrome Behaviors Reported by Pet Owners

- Dog or cat stares at 1 location or off into space for an extended period of time
- Dog or cat gets stuck behind furniture and has difficulty moving out of tight spaces
- Dog or cat has delayed response to greeting family members when they return home
- Dog or cat is less responsive or nonresponsive to verbal cues or has difficulty localizing sounds
- Dog fails to recognize human and canine friends
- Dog fails to signal the need to go outside and eliminates near the door
- Cat chooses to eliminate in a location closer to where it sleeps versus traveling to the litter box
- Dog or cat disrupts owner's sleep–wake cycle (e.g., dog paces throughout the night, cat yowls in the middle of the night for hours)

DIAGNOSIS

CDS can be diagnosed based on questionnaire results combined with results of physical, ophthalmologic, and neurologic examinations and blood analysis. Ruling out and treating underlying medical conditions is important (**FIGURE 1**). Underlying diseases, such as osteoarthritis, endocrinopathies, renal disease, gastrointestinal disease, and neurologic conditions, can present with clinical signs similar to CDS. The use of certain medications, such as corticosteroids, benzodiazepines, and anticonvulsants, can exacerbate

clinical signs associated with CDS. Medications that have polydipsia and polyuria as a side effect can lead to difficulties with bladder control and increase the risk of house-soiling episodes.

History and Physical Examination

At minimum, senior pets should be evaluated at wellness visits with a thorough physical, orthopedic, neurologic, and ophthalmologic examination. According to the 2023 AAHA Senior Care Guidelines for Dogs and Cats, cats older than 10 years are considered senior, whereas dogs are considered senior when they are in the "last 25% of estimated lifespan."[17] This estimate for dogs may account for differences due to size and breed. Wrightson et al have recommended regular screening for cognitive decline once the pet has reached 50% to 75% of its expected lifespan, to facilitate early management and treatment.[8]

Diagnostic tests should include a serum chemistry profile, complete blood count, T_4 (thyroxine) test, urinalysis, and blood pressure measurement. Current medical conditions need to be adequately managed.

Taking a detailed history is imperative. Sometimes the history may reveal that the pet's problem may be due to changes in the owner's work schedule. For example, a dog owner may be leaving their pet inside the house for longer periods of time; therefore, house-soiling occurs because the dog expects to be allowed outside after a certain period of time. Cats with osteoarthritis may experience pain or be unable to step into a litter box with high sides. Therefore, the cat may choose a location that is more convenient but not necessarily acceptable to the owner. Information about mobility can be obtained by asking owners about their pet's ability to jump on and off furniture and go up and down stairs.

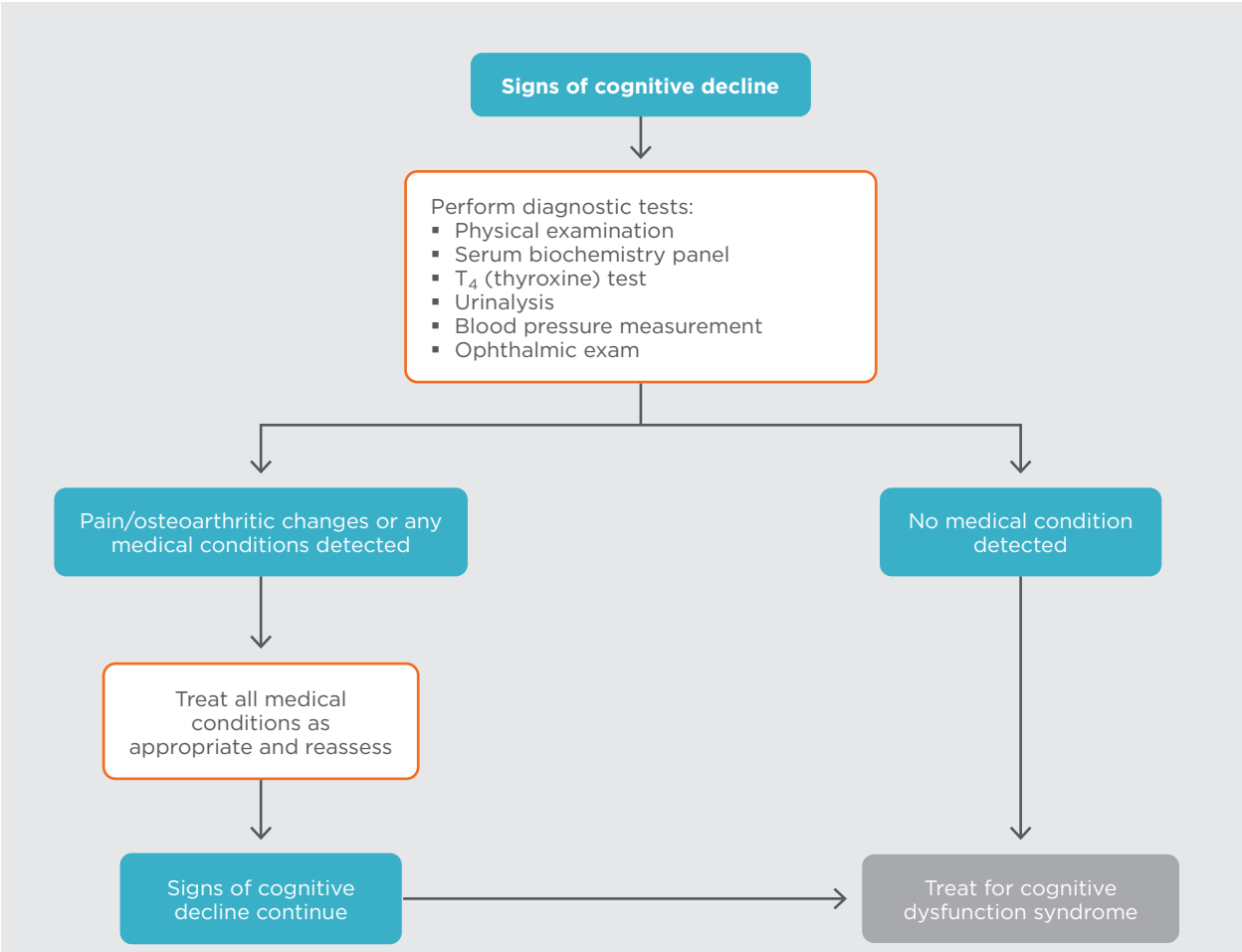

FIGURE 1. Algorithm for diagnosis of cognitive dysfunction syndrome.

Magnetic Resonance Imaging

Clinicians may recommend referral to a neurologist for magnetic resonance imaging (MRI); however, many clients may decline referral due to financial constraints or reluctance to put their elderly pet under anesthesia.

MRI also may not provide meaningful contributions to the treatment plan. Sometimes MRI allows visualization of brain changes that may be related to clinical signs of CDS, such as cortical atrophy and periventricular changes to the white matter.[8] However, these abnormalities are not always specific to CDS. Sometimes MRI shows no obvious abnormalities in the brain and the patient still exhibits signs indicative of CDS.

Dewey et al noted that dogs can have leukoaraiosis, which are areas of periventricular white matter hyperintensities on MRI images.[18] These areas are caused by vascular abnormalities of the arterioles and have been associated with Alzheimer disease in humans. Dewey et al also reported that dogs with suspected leukoaraiosis and an interthalamic adhesion thickness of 5 mm or less were consistently diagnosed with CDS.[18]

Clinical Questionnaires

Several questionnaires can be used in clinic with the client to aid in the diagnosis of CDS, such as the Canine Cognitive Dysfunction Rating (CCDR) scale, the Canine Dementia Scale (CADES), and the Canine Cognitive Assessment scale.[15] Clinicians can use the existing canine questionnaires and adapt them for use in feline patients by adding in categories for vocalizations, litter box use, and grooming.

The CCDR has 13 questions.[19] The first 7 ask the pet owner how often a certain behavior is observed, while the next 6 ask the pet owner whether the frequency of the behavior has changed in the past 6 months. The behaviors are classified into orientation, memory, apathy, impaired olfaction, and locomotion. The total score ranges from 13 to 80 points. Dogs with no signs of CDS (13 to 39 points) are considered normal. Dogs scoring 40 to 49 points are at risk of developing CDS, and those scoring 50 to 80 points are diagnosed with CDS.

The CADES contains 17 items divided among 4 behavior categories: spatial orientation, social interactions, sleep–wake cycles, and house soiling. This scale can be used to monitor the development of cognitive impairment over time.[20] One study of dogs aged between 8 and 16 years found that the conversion rate from cognitively normal to mild cognitive impairment was 71.45% at 12 months.[20]

RAISING OWNER AWARENESS

One way to raise owner awareness of possible cognitive decline in their pets is to have them use a home assessment questionnaire. A questionnaire for dogs is available from go.navc.com/4fUJpIf. Owners answer some simple questions to determine if their dog is showing signs of cognitive decline. It is not a diagnostic tool but rather is intended for owners of dogs over 7 years of age to fill out at home and to use regularly to determine if there is a change in their dog's behaviors. No corresponding commercial questionnaire for cats is available; however, clinicians can use the existing canine screens and adapt to add in categories for vocalizations, litter box use, and grooming.

A recent study looked into the use of tests that pet owners can perform at home to aid in the determination of cognitive decline.[21] The study included 39 dogs (25 females and 14 males) of different breeds with ages ranging from 9.3 to 15.3 years. The tests assessed the dogs' ability to interpret social cues, working memory, executive function, and sustained attention. More refinement is needed before these tests can be used clinically; however, the study concluded that, in combination with plasma biomarker tests (see **EMERGING BIOMARKERS FOR CDS** sidebar) and questionnaires, they could eventually be used to track cognitive decline.

TREATMENT

The recommendations in this section apply to all senior pets regardless of whether they are diagnosed with CDS. The sooner these strategies are implemented, the better chance there is of delaying the progression of cognitive impairment.

A comprehensive treatment plan involves the following components:

- Environmental modification
- Enrichment
- Exercise
- Training
- Use of nutritional supplements
- Use of prescription diets
- Use of medication

Environmental Measures

Senior pets do best in an environment where they feel safe and stable. In households with slippery floors, this can involve providing more traction, such as placing area rugs in strategic areas to create a pathway for the pet to navigate the house without falling down. Other general recommendations include removing major obstacles that impede the pet's route through the house and providing ramps or stairs to allow the pet to move on and off furniture more easily. However, rearranging furniture may cause the pet difficulty in remembering how to navigate a location.

Dogs should be taken out more frequently for elimination since they may not be able to hold their bladder or colon for long periods of time.

Enrichment and Exercise

Enrichment can improve the pet's mental wellbeing by allowing them to engage in species-specific activities such as using their nose, paws, and mouth to play with certain toys or work for certain treats. By keeping pets mentally engaged, these activities can slow down the progression of mental decline.[16]

All of the pet's senses should be engaged in enrichment activities. Owners can provide visual stimulation by allowing pets to have a view of the outside world, if it does not elicit undesirable behaviors such as barking. Pet television and YouTube videos also exist to provide pets with visual stimulation, and music designed and arranged specifically for dogs and cats is available.

Senior cats can still play with toys. Merely moving a toy to stimulate a cat to bat at it or just to track the toy's movement with their eyes can improve mental wellbeing.

Taking senior dogs on walks to encourage sniffing can help keep them mentally stimulated. Providing novel scents such as lavender or rabbit has also been found to be stimulating.[22] Other options include ethically sourced wool or feathers.

Providing small amounts of novel flavors can stimulate appetite and interest in food as long as the novel food does not upset the pet's stomach and cause vomiting or diarrhea. The use of puzzle toys/feeders can stimulate and engage pets with foraging. Warming up food to enhance its aroma and taste may entice elderly pets with a decreased appetite to eat more regularly.

Emerging Biomarkers for CDS

In humans, certain biomarkers correlate to cognitive decline. For example, ocular changes (including thinning of the retinal nerve fiber layer), senile plaques, neurofibrillary tangles in the retina, optic nerve cupping, and changes in lens and blood vessels can be early indicators for the development of Alzheimer disease.[1]

Biomarkers for CDS are being studied in dogs. One biomarker of interest is the plasma neurofilament light (NfL) protein level, which increases as dogs age. However, plasma NfL is a nonspecific marker of neuronal death; therefore, its rate of change over time is more enlightening than a single measurement. In a recent study, researchers used an immunomagnetic reduction assay to detect the concentration of plasma NfL in dogs.[2] The Canine Cognitive Dysfunction Rating scale was used to distinguish between physiological and pathological aging. The results showed that the plasma NfL levels of dogs diagnosed with CDS were significantly higher than those of dogs not diagnosed with CDS ($P < 0.01$). Further research is needed to determine if this is a reliable test to use in the diagnosis of canine CDS.

Cerebrospinal fluid amyloid β (CSF $A\beta_{42}$) is also being studied as a biomarker for CDS in dogs. Laboratory beagles with higher levels of CSF $A\beta_{42}$ had lower performance in cognitive tasks in 1 study.[3] Cognitive impairment is likely to occur prior to cerebral amyloid deposits. Like plasma NfL, tests for CSF $A\beta_{42}$ need to be validated and standardized before they are available for clinical use.

CDS = cognitive dysfunction syndrome.

[1]*Ozawa M, Inoue M, Uchida K, Chambers JK, Takeuch Y, Nakayama H. Physical signs of canine cognitive dysfunction.* J Vet Med Sci. *2019;81(12):1829-1834. doi:10.1292/jvms.19-0458*

[2]*Wu CH, Pan XS, Su LY, Yang SY. Plasma neurofilament light chains as blood-based biomarkers for early diagnosis of canine cognitive dysfunction syndrome.* Int J Mol Sci. *2023;24(18):13771. doi:10.3390/ijms241813771*

[3]*Borghys H, Van Broeck B, Dhuyvetter D, et al. Young to middle-aged dogs with high amyloid-β levels in cerebrospinal fluid are impaired on learning in standard cognition tests.* J Alzheimers Dis. *2017;56(2):763-774. doi:10.3233/JAD-160434*

Exercise is neuroprotective; therefore, pet owners should continue to provide regular play sessions and exercise for their senior pets, adjusted for the pet's endurance as needed. For example, if a senior dog can no longer go on a 10-mile hike, the owner can aim for a 10- to 15-minute walk around the block. More active dogs have a lower likelihood of being diagnosed with CDS.

Pet owners should also just sit and spend time with their senior pets.

Nutritional Supplements

Several over-the-counter senior supplements can help improve some of the clinical signs of CDS. These supplements contain ingredients that fight free radical and oxidative changes in the brain (**TABLE 2**). The following are a few examples of available supplements.

Senilife (Ceva, **senilife.com**) contains several ingredients intended to address cognitive decline: *Gingko biloba*, pyridoxine, phosphatidylserine, vitamin E, and resveratrol.[23] It has been used off label in cats.

Novifit (Virbac, **us.virbac.com**) is a tosylated *S*-adenosyl-L-methionine (SAMe) shown to improve cognitive function in dogs and cats. In a randomized, double-blind, placebo-controlled, multicentric clinical study, dogs aged 8 to 15 years had increased activity and interactions with their owners after 8 weeks of treatment.[26] Clinical and behavioral evaluations along with a standardized behavior questionnaire were used at baseline and at 4 and 8 weeks after treatment. SAMe needs to be used with caution with other serotonergic medications.

Aktivait (VetPlus, **vetplus.co.uk**)contains many antioxidants and ingredients that fight free radicals, including *N*-acetyl cysteine, α-lipoic acid, L-carnitine, coenzyme Q_{10}, phosphatidylserine, docosahexaenoic acid, and eicosapentaenoic acid.[27] The canine version of Aktivait should not be used in cats because it contains α-lipoic acid, which is toxic to cats[4]; however a feline version is available. Aktivait has been difficult to obtain in the United States.

Prescription Diets

Two prescription diets designed to support brain health in dogs are available: Purina Pro Plan Veterinary Diets NC NeuroCare (**proplanvetdirect.com**) and Hill's Prescription Diet b/d Canine (**hillspet.com**).

NeuroCare addresses the fact that cognitive function declines when cerebral glucose metabolism is low. It provides medium-chain triglycerides (MCTs), which increase ketone levels in the brain, creating an alternative energy source to improve cognitive function. Older beagles fed a diet containing MCTs performed better in cognitive tests than did a control group fed a diet that did not contain MCTs.[28] NeuroCare is also used for patients with seizure disorders.

Purina's over-the-counter product Bright Mind (**purina.com**) can also support brain health. This diet is formulated for seniors and contains 5.5% MCTs as well as the other neuroprotective ingredients in NeuroCare.

Hill's Prescription Diet b/d contains several ingredients that have antioxidative effects and reduce the toxic effects of free radicals. They may also have an anti-inflammatory effect on the brain. In a 2-year longitudinal study, the use of behavioral enrichment and this diet decreased the rate of cognitive decline.[29]

TABLE 2 Selected Ingredients in Supplements for Cognitive Dysfunction Syndrome

INGREDIENT	BIOLOGIC ROLE	CLINICAL EFFECT
Phosphatidylserine	Phospholipid; necessary for maintenance of cell membrane; may facilitate neuronal processes and stimulate acetylcholine release and neurotrophic growth[23]	Has been shown to have an effect on interactions, memory, and activity level in humans and rodents[23,24]
Ginkgo biloba	Antioxidant; may protect against development of Aβ lesions	Improved cerebral blood flow; increased glucose metabolism
Resveratrol	Antioxidant; protects neurons from toxic substances	Lessens Aβ in the brain[25]
SAMe	Glutathione production maintains cell membrane and receptor function; decreases monoamine neurotransmitter turnover; increases production of endogenous antioxidants	Increased attention and executive function

Aβ = amyloid β; SAMe = S-adenosyl-L-methionine

Generic human antidepressants, such as selective serotonin reuptake inhibitors (SSRIs) and tricyclic antidepressants (TCAs), have been used for decades in dogs and cats for their anxiolytic effects.

No prescription feline diets to treat CDS exist. However, commercial feline senior diets have been found to increase longevity in cats. Diets that contain antioxidants, essential fatty acids, chondroprotectants, L-carnitine, and lysine have been found to be helpful for CDS signs in cats.[4] Diets found to have positive effects in senior cats include Hill's Science Diet Adult 7+, Purina Pro Plan Adult 7+, and Hill's Prescription Diet j/d Feline.[4,16]

Medications

Anipryl (selegiline hydrochloride; Zoetis, zoetisus.com) is an FDA-approved medication for the treatment of CDS in dogs. It is used off label to treat CDS in cats. Selegiline is a monoamine oxidase B inhibitor that enhances catecholaminergic transmission and enhances dopamine function by increasing dopamine synthesis and release and decreasing dopamine reuptake.[30] Selegiline also increases free radical removal and reduces neurotoxicity by decreasing free radical production. Selegiline increases the lifespan of healthy dogs.[31]

In 1 study, 69 dogs aged 7 to 19 years received 0.5 mg/kg selegiline.[32] Of the dogs in the study group, 46% exhibited 11 or more behavioral and cognitive problems. The owners filled out questionnaires regarding the dog's response based on 15 behavioral and cognitive parameters. The proportion of dogs with noted improvements was 77% after the first month, 76% after the second month, and 78% after the third month. No studies have been performed in cats, but there have been some positive anecdotal reports.[4]

The canine dose for selegiline is 0.5 to 1 mg/kg/day, and the feline dose is 0.25 to 1 mg/kg/day, rounded to the nearest whole tablet. The onset of effect can take 4 to 12 weeks. If effective, treatment is lifelong. Potential side effects include vomiting, diarrhea, restlessness, anorexia, neurologic, lethargy, and salivation. Selegiline has noted interactions with several classes of medications, and washout periods are required for some.

Generic human antidepressants, such as selective serotonin reuptake inhibitors (SSRIs) and tricyclic antidepressants (TCAs), have been used for decades in dogs and cats for their anxiolytic effects. Pets that cannot tolerate selegiline should be placed on either an SSRI or a TCA to treat anxiety corresponding with cognitive decline. Short-acting anxiolytics, such as benzodiazepines (e.g., alprazolam, clonazepam, lorazepam), trazodone, gabapentin, and clonidine, can be used to improve quality of life.

SUMMARY

CDS in dogs and cats is easily overlooked by uninformed owners. It is a diagnosis of exclusion. With early diagnosis and early intervention, veterinarians can help pet owners preserve their pets' quality of life and mental wellbeing and maintain the human–animal bond, thereby allowing beloved pets to age gracefully and reducing caregiver burden. TVP

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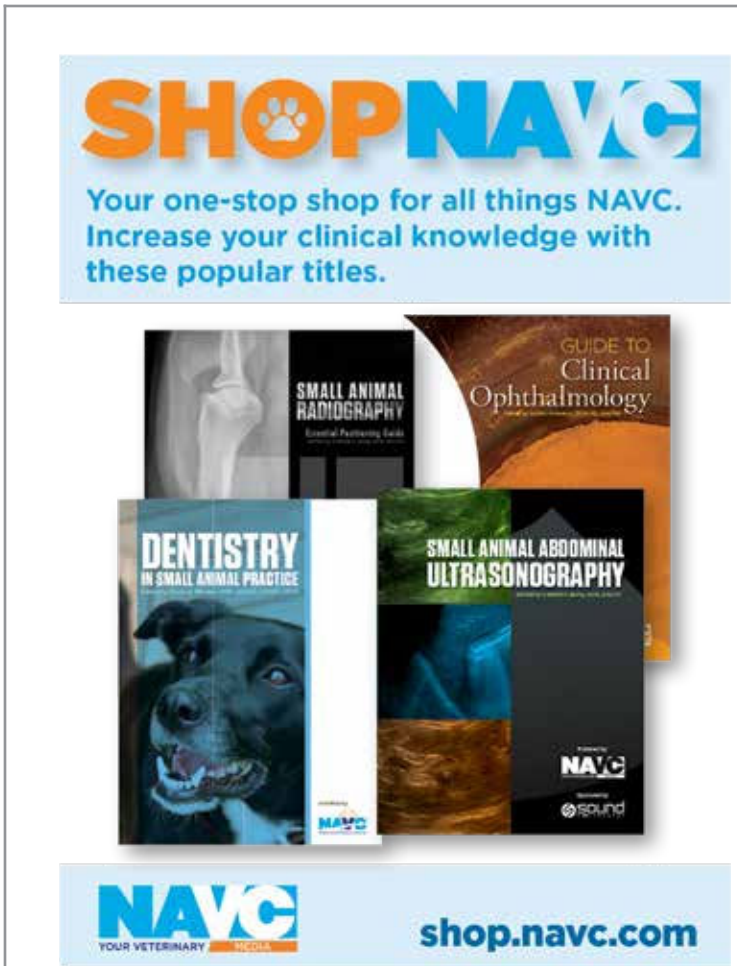

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CE QUIZ QUESTIONS

1. **Cognitive dysfunction has been diagnosed in which of the following species?**
   a. Humans
   b. Dogs
   c. Cats
   d. All of the above

2. **Which of the following is the only FDA-approved medication to treat canine cognitive dysfunction?**
   a. Prozac (fluoxetine)
   b. Lyrica (pregabalin)
   c. Anipryl (selegiline)
   d. Valium (diazepam)

3. **Cognitive dysfunction syndrome (CDS) in dogs and cats is often:**
   a. Observed by owners
   b. Observed by clinicians
   c. Overlooked by owners and overdiagnosed by clinicians
   d. Overlooked by owners and underdiagnosed by clinicians

4. **What does successful aging mean?**
   a. Achieving 7 years of age or more
   b. Maintaining physical health but may have mental decline
   c. Aging during which cognitive deterioration does not affect day-to-day functioning
   d. Having mild mental decline

5. **The acronym DISHAAL stands for:**
   a. Disorientation, changes in interactions, sleep–wake cycle changes, house-soiling, activity level alterations, anxiety, and learning
   b. Dizziness, changes in interactions, sleep–wake cycle changes, house-soiling, activity level alterations, anxiety, and learning
   c. Disorientation, changes in interactions, sleep–wake cycle changes, howling, activity level alterations, anxiety, and learning
   d. Disorientation, changes in interactions, sleep–wake cycle changes, house-soiling, activity level alterations, aggression, and learning