



BEAGLE Update

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BRAIN HEALTH

Dealing with Cognitive Dysfunction Syndrome



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COGNITIVE DYSFUNCTION SYNDROME

AFFECTS SENIOR BEAGLES

“Unlike in humans with Alzheimer’s disease, CDS is generally not a cause of death in dogs. That is, unless the behaviors cannot be sufficiently managed or they seriously impact the welfare of the dog or the owner.”

Veterinary behaviorist Gary Landsberg, DVM, DECAWBM, of CanCog Inc. in Fergus, Ontario, Canada

Twelve-year-old “Penny,” a tricolor 13-inch Beagle, was slipping away bit by bit, as she struggled to remember her routine, her family and her housetraining skills. The independent, self-confident female had become anxious when left home alone, shredding magazines into confetti and trying to squeeze her 25-pound body into the safe, tight space under the recliner.

Unbeknown to owners Terri Grimm Walter and her husband of Germantown, Wisconsin, Penny had canine cognitive dysfunction syndrome (CDS), an irreversible degeneration of the brain similar to Alzheimer’s disease. The slow onset of behavioral changes caused by the progressive disorder makes CDS challenging for owners to recognize until dogs are well into their senior years.

“Over the past year, Penny had begun howling and wailing all night, keeping us up,” Grimm Walter says. “She would pace back and forth.

We learned that this behavior is called sundowner’s syndrome, and it also occurs in people with dementia due to Alzheimer’s disease.”

Veterinary behaviorist Gary Landsberg, DVM, DECAWBM, of Fergus, Ontario, Canada, says, “Sundowner’s syndrome is a hallmark sign of CDS, and it is further enhanced by the distress it causes owners. Sundowning is a disruption in a dog’s sleep/wake cycles depicted by increasing confusion, agitation and activity as the day progresses to night.”

“The time came for Penny’s annual vaccinations. We were hoping the veterinarian could help us fix her problems,” says Grimm Walter. “Instead, he told us that it was her brain — not her body — causing the changed behaviors.”

The family’s love for Penny, their second Beagle, led Grimm Walter to a Canine Cognitive Disorder Support Group on Facebook with more than 8,000 members. “This group shares a lot of good ideas and tools,” she says. “It is important to keep your dog active both physically and mentally.”

Despite the excellent care the family gave Penny, she died in late July 2020. However, the cause of death was liver disease, not CDS.

“Unlike in humans with Alzheimer’s disease, CDS is generally not a cause of death in dogs,” Dr. Landsberg says. “That is, unless the behaviors cannot be sufficiently managed or they seriously impact the welfare of the dog or the owner. Fortunately, there are ways to promote brain



“Penny,” a beloved Beagle who ultimately died from liver disease, struggled with cognitive dysfunction syndrome in her last year of life.

health and enrich the life of a dog with CDS.”

Thanks to advances in nutrition and preventive veterinary care combined with greater awareness of canine health and well-being, dogs in general live longer today. Senior dogs that age successfully have lives that are rich in physical and cognitive exercises and behavioral stimulation. The changes seen in dogs with CDS are beyond what is expected to occur in aging.

As a medium-sized breed, Beagles are considered senior dogs at age 7. [A study published in *Applied Animal Behaviour Science*](#) in 2015, reported that the prevalence of CDS ranges from 13 to 16 percent in dogs 8 to 11 years of age and from 87 to 100 percent in dogs greater than 13 years of age. Most cases of CDS — up to 85 percent — go undiagnosed until signs become problematic for the dog or owner.

“As dogs age, eventually end-of-life health problems, such as failing organ systems and/or degenerative brain changes, occur. To diagnose potential health problems as soon as possible so that treatment can begin sooner, dogs over 8 years old should be scheduled for twice annual veterinary visits. During these visits, dogs should be screened with a cognitive assessment questionnaire,” Dr. Landsberg advises.

AN ACCURATE DIAGNOSIS

An accurate diagnosis of CDS involves first ruling out medical, physical and motor dysfunction disorders with similar clinical signs. “Neurological conditions, sensory decline, endocrine and metabolic disorders as well as pain caused by musculoskeletal or gastrointestinal disease can cause or contribute to the signs of CDS,” says Dr. Landsberg.

To help owners and their veterinarians evaluate the mental sharpness of senior dogs, and to help veterinarians diagnose CDS, Dr.



PHOTO: RHONDA CASSIDY

Landsberg recommends using a screening questionnaire known by the acronym DISHAA (see page 5). [The DISHAA Assessment Tool](#), which was developed by the Purina Institute, provides a rating system in which owners score their dogs’ behavior related to signs of advancing brain pathology. DISHAA queries owners about behaviors reflecting: disorientation; changed social interactions; interrupted sleep/wake cycles; learning and memory deficits, including housetraining; activity changes; and increased anxiety.

CDS upsets many basic behaviors due to the degenerative changes that impair memory and learning. Behaviors commonly reported by owners include dogs becoming disoriented in their homes and yards, losing housetraining skills, and like Penny, sleeping more during the day and staying awake more at night. They also get stuck or have difficulty getting around objects, stare blankly at walls, floors or into space, walk into doors, aimlessly pace or wander about, and are not socially interested in their families.

“While activity may initially decline in the early stages of CDS, an increase in spontaneous activity is seen as cognitive dysfunction becomes more severe,” says Dr.

Landsberg, who is vice president of veterinary affairs for CanCog Inc. in Fergus, Ontario, Canada. CanCog specializes in evaluating and assisting in the development of innovative products related to cognition, behavior, anxiety, aging, and life span focused on improving the quality of life for companion animals.

According to a [long-term follow-up study of dogs with cognitive dysfunction published in 2013 in the *Journal of Veterinary Internal Medicine*](#), 46 percent of dogs diagnosed with CDS exhibited increased anxiety and agitation. Comparatively, 4 percent of senior dogs unaffected with CDS experienced anxiety and agitation.

Oxidative stress is the main culprit causing a senior dog to have a mixed-up, changed personality. “The cumulative burden of oxidative stress over time affects brain aging,” Dr. Landsberg says. “Physical atrophy occurs in certain areas of the brain due to oxidative damage and de-

creased energy metabolism. The brain is particularly susceptible to free radicals because it has a high rate of oxidative metabolism, a high content of lipids, or fats, and a limited ability to regenerate.”

Purina Principal Research Scientist Yuanlong Pan, PhD, who studies healthy aging in dogs, says, “Reduced brain-glucose metabolism is a common feature of aging, which at least partially contributes to the decline in brain function in middle-aged and older people and dogs. One of the strategies is to provide the brain with an alternative energy source called ketone bodies. This natural energy source, which is mainly produced in the liver from body fat, is used by the tissues such as the brain, heart, kidney, and muscle.”

The irreversible brain atrophy that occurs in brain aging and CDS relates to the gradual loss of neurons and synapses, and the reduced ability of the brain to use glucose as energy. Passing through synapses, neurons transmit information between different areas of the brain and between the brain and the central nervous system.

“People with Alzheimer’s disease and dogs with CDS share common morphological and metabolic changes in their brains, including advanced cortical atrophy, ventricular enlargement and impaired cerebral glucose metabolism,” Dr. Pan explains. “Multiple risk factors are associated with brain aging and a higher risk of dementia in people and dogs.”

MULTIFACETED TREATMENT

A multifaceted treatment approach for dogs with CDS is ideal. A treatment plan should include mental stimulation, daily physical activities, pharmacology support, and an appropriate, healthy diet. Engaging the dog socially, physically and mentally throughout the day will help boost cognitive function. Importantly,



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Advancing Science for Pet Health



COGNITIVE DYSFUNCTION SYNDROME

ASSESSMENT TOOL

What is DISHAA?

DISHAA is a tool to help you and your veterinarian assess the mental acuity of your dog, and for your veterinarian to potentially diagnose Cognitive Dysfunction Syndrome (CDS).

Please complete this canine senior pet cognitive assessment. If you've noticed changes in multiple behavioral categories, be sure to talk to your veterinarian today about the health of your pet's aging brain.

BEHAVIORAL SIGNS

Identify signs that have arisen or progressed since 8 years of age and older.

Score as 0=none, 1=mild, 2=moderate, 3=severe

- D DISORIENTATION
- I SOCIAL INTERACTIONS
- S SLEEP/WAKE CYCLES
- H HOUSESOILING, LEARNING AND MEMORY
- A ACTIVITY
- A ANXIETY

DISORIENTATION	Score
Gets stuck, difficulty getting around objects, goes to hinge side of door	
Stares blankly at walls, floor, or into space	
Does not recognize familiar people/familiar pets	
Gets lost in home or yard	
Less reactive to visual (sights) or auditory (sounds) stimuli	
SOCIAL INTERACTIONS	Score
More irritable/fearful/aggressive with visitors, family or other animals	
Decreased interest in approaching, greeting or affection/petting	
SLEEP/WAKE CYCLES	Score
Pacing/restless/sleeps less/waking at night	
Vocalization at night	
HOUSESOILING, LEARNING AND MEMORY	Score
Less able to learn new tasks or respond to previously learned commands/name/work	
Indoor soiling of urine ___ or stool ___ /decreased signaling to go out	
Difficulty getting dog's attention/increased distraction/decreased focus	
ACTIVITY	Score
Decrease in exploration or play with toys, family members, other pets	
Increased activity including aimless pacing or wandering	
Repetitive behaviors, e.g., circling ___ chewing ___ licking ___ stargazing ___	
ANXIETY	Score
Increased anxiety when separated from owners	
More reactive/fearful to visual (sights) or auditory (sounds) stimuli	
Increased fear of places/locations (e.g., new environments/going outdoors)	
TOTAL	

Once this form is completed, your veterinarian will determine the cause of these signs through a physical examination and recommended diagnostic tests. However, even if your senior pet is experiencing multiple health issues associated with aging, there may be some degree of CDS.

A score of 4-15 is consistent with mild, 16-33 is moderate, and >33 is severe CDS.

ASSESSMENT WAS CREATED BY: DR. GARY LANDSBERG, DVM, DECAWBM, VICE PRESIDENT, VETERINARY AFFAIRS CANCOG INC., TO AID IN DIAGNOSING CANINE COGNITIVE DYSFUNCTION SYNDROME. PURINA TRADEMARKS ARE OWNED BY SOCIÉTÉ DES PRODUITS NESTLÉ S.A. PRINTED IN USA. VET0938A-0517

TIPS ON ENRICHING THE LIVES OF DOGS WITH CDS

Enrichment exercises such as these can help extend the health of a senior dog that has begun to show signs of cognitive dysfunction syndrome (CDS).

PHYSICAL ENRICHMENT

- Daily exercise of 10 to 15 minutes long several times a day helps to increase blood flow and oxygen supply to the body, including the brain, thus helping to improve cognitive function and decrease dementia
- Activities such as taking walks, swimming, practicing scent work, or reward training help to maintain physical fitness
- Frequently switch out toys and add new activities. Interactive toys requiring puzzle solving and hide-and-seek keep a dog moving

SOCIAL ENRICHMENT

- Increase your dog's social interactions with humans and other dogs
- Plan short outings to places that give the dog new sights and smells

MENTAL ENRICHMENT

- Offer games and activities that require your dog to think to find a hidden toy or treat
- Toys containing treats or parts that the dog pulls out or apart help to stimulate cognition

exercise increases blood flow and oxygen throughout the body, including the brain, to help decrease dementia.

"Maintaining or increasing enrichment for brain health effectively contributes to the well-being of a dog with CDS," Dr. Landsberg says. "Feeding activities, such as food puzzles and scavenging games, help keep a dog's brain active. Physical activities may need to be modified, shorter, slower, or more limited. Consider trying activity puzzles, hide-and-seek games, reward training, and scent work to boost mental and physical enrichment."

The only drug approved for treating dogs with CDS is selegiline, which is marketed as Anipryl®. It works by increasing the dopamine levels in the brain. Low levels of dopamine, a neurotransmitter released from the hypothalamus of the brain, contribute to the unreactive, inhibitory behaviors seen in dogs with cognitive dysfunction.

Veterinarians may prescribe the drug fluoxetine, marketed as Reconcile®, to help reduce a dog's anxiety, agitation and sleep/wake cycle changes due to CDS. Licensed

for use in canine separation anxiety, fluoxetine increases the levels of serotonin, a neurotransmitter responsible for social interactions, awareness and adaptability.

"A veterinarian will determine the best course of treatment for an individual dog," Dr. Landsberg says. "Fluoxetine might better control the anxiety associated with CDS, as these two drugs, fluoxetine and selegiline, cannot be used together. Regardless which approach is tried, it can take one to two months to be able to achieve the full pharmacological effect."

Treating dogs with CDS would be remiss without including nutrition focused on reducing the effects of oxidative stress, correcting the metabolic changes associated with cognitive decline, and improving mitochondrial function, neuronal health and signaling. Researching nutrition shown to reduce or eliminate known risk factors for Alzheimer's disease in people, Dr. Pan hypothesized that a blend of nutrients including optimal levels of antioxidants, arginine, B vitamins, and omega-3 polyunsaturated fatty acids (PUFAs) from fish oil could potentially improve brain function and reduce the rate of brain atrophy in dogs with CDS.

Dr. Pan was the lead investigator of a six-month trial evaluating the effectiveness of a diet containing the nutrient blend compared to a control diet in enhancing cognitive performance in dogs 9 to 11 years of age. The findings were [published in 2018 in the *British Journal of Nutrition*](#).

"The results showed that the diet containing the nutrient blend significantly improved learning, memory and problem-solving ability in senior dogs," Dr. Pan says. "This study validated the notion that healthy brain aging and cognitive function are promoted by slowing the aging-induced changes in the brain and reducing or eliminating

the risk factors associated with brain aging and dementia.”

In an earlier [study published in 2010 in the *British Journal of Nutrition*](#), Dr. Pan investigated the cognitive-enhancing benefits of a diet supplemented with medium-chain triglyceride (MCT) in providing ketones as an alternative energy source to offset the reduced brain-glucose metabolism that occurs as dogs age. “We showed that dietary MCT, serving as the precursors for ketone body production, can significantly improve cognitive function in healthy senior dogs,” he says.

During the trial, older dogs were randomly assigned to one of two groups based on cognitive testing. They were fed a control diet or a diet containing 5.5 percent MCT for eight months. Dogs were tested on their learning ability, memory and attention. Those fed the MCT diet showed significantly better performance on most of the tests than the control dogs.

Meanwhile, in a collaborative study, Dr. Pan and Dr. Landsberg investigated whether a diet that combines the nutrient blend and the additional energy source provided from MCT would improve cognitive function and clinical signs of CDS in aging dogs. The dogs’ owners had scored their behaviors as indicative of cognitive decline using the DISHAA Assessment Tool.

[Published in December 2018 in *Frontiers in Nutrition*](#), this prospective, double-blinded, placebo-controlled trial evaluated 87 dogs ranging in age from 9 to 16 years old. The dogs were fed one of three diets for 90 days: a control diet; a diet containing 6.5 percent MCT plus the nutrient blend; or a diet containing 9 percent MCT plus the nutrient blend.

“Dogs fed the 6.5 percent MCT diet improved significantly in all six DISHAA behavioral categories over the 90 days,” Dr. Landsberg

says. “Most of the improvements were noted in 30 days. Comparatively, dogs fed the control diet showed improvement in four of the six categories, and dogs fed the 9 percent MCT diet only showed improved behavioral responses when they accepted the diet.”

“We have shown that dietary MCT and the nutrient blend help to improve learning, memory and executive function in senior dogs and adding a higher level of MCT to the nutrient blend has a synergistic beneficial effect on cognitive function in dogs with CDS,” Dr. Pan says.

As for Penny, the Beagle, similar to other dogs diagnosed with CDS, she slowly worsened over the last year of her life. The family kept her active taking her on frequent walks, and the veterinarian prescribed fluoxetine to ease her anxiety. Despite the love and attention she received, Penny’s cognitive impairments robbed the family of the dog they had grown to love.

“By the end, Penny had a delicate nature,” says Grimm Walter. “She had an aversion to noise, was easily agitated to the point of being combative and had started having frequent accidents in the house. The cognitive dysfunction had reached a point where she was having more bad days than good.”

Despite the challenges in dealing with Penny’s CDS, the family embraced every opportunity to enrich her life. “We were open to trying anything,” Grimm Walter says. “Mostly, she loved going for walks with us. Spending time together was the best part of every day.” ■

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