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## **STRENGTHENING THE HUMAN – ANIMAL CONNECTION**

### **Cognitive Dysfunction Syndrome**

Cognitive Dysfunction Syndrome (CDS) is a syndrome that describes the changes that can occur in the canine brain as dogs age. This syndrome resembles some of the mentally incapacitating diseases that occur in humans, including Alzheimer's disease. The clinical signs which are associated with CDS include disorientation, altered interactions with family members, decreased activity (including eating), changes in sleep cycle (night waking), and house soiling. There are also a variety of other signs that can be associated with brain aging. These include depression or apathy, increased anxiety and phobias, repetitive or compulsive disorders, increased vocalization, aggression and problems with learning and memory.

The incidence of CDS is far greater than pet owners may realize. According to Gary Landsberg, DVM and board certified in Veterinary Behavior, "Some studies have found that greater than 50% of dogs over the age of 11 have at least one sign of cognitive decline." He adds that this number may actually be low since special lab testing can detect deficits in learning ability and memory long before clinical signs develop.

We are used to the concepts of dementia and Alzheimer's in terms of aging humans. We now know that similar changes can occur in the brains of aging canines. Many different disease processes can negatively affect the brain including degenerative changes, inflammatory conditions (including infectious and immune-mediated diseases), vascular diseases or changes, nutritional issues and neoplastic changes. There are quite a few degenerative changes that can occur in the brains of older dogs. These include changes in the brain's architecture, and the accumulation of a protein called beta amyloid.

Beta amyloid is the same protein that accumulates in the brains of Alzheimer's patients. Beta amyloid not only found in the brain tissue but it can also accumulate in the vessels within the brain. This, along with other blood vessel changes in an aging brain, decreases blood flow to the brain and decreases glucose utilization. Beta amyloid is neurotoxic and leads to decreased neuronal (brain cell) function, degeneration of the synapses (communication between brain cells), neuron loss and a depletion of neurotransmitters. It also correlates with the severity of CDS. This means that as more and more amyloid accumulates in the brain, the signs of CDS worsen. Thus, CDS is a progressive disease.

As brain cells age, they become less efficient and start to produce more free radicals (also known as reactive oxygen). The brain is particularly susceptible to the effects of free radicals. These negative effects include cell damage, cell dysfunction, mutation (genetic change of the cells), neoplasia (cancer), and even cell death.

We are all familiar with the term “anti-oxidants” and the general idea that they help to maintain proper health. Normally, anti-oxidants eliminate the free radicals as they are produced, thus protecting our cells (including the brain cells) from their negative effects. Knowing this, it makes perfect sense that supplying an aging animal with antioxidants would improve both memory and learning.

Supplying CDS patients with a rich variety of antioxidants is, in fact, the cornerstone of treatment for CDS. If we intervene early in the course of disease, we can prolong the lifespan of the pet. Clinical signs of brain aging can be subtle and slowly progressive so it is very important for pet owners to know about these signs and report them to their veterinarian as soon as they become evident so that early intervention can begin. Cognitive checklists can be very helpful in identifying cognitive decline.

Before a treatment plan can be established, other medical causes for the above mentioned behavior changes need to be considered. These include changes in organ function such as liver or kidney function decline/disease, metabolic changes (hypothyroidism), other endocrine diseases such as Cushing’s disease, Addison’s disease, and Diabetes mellitus. Painful conditions such as dental disease and osteoarthritis can also affect behavior. Painful limbs or back may prevent the pet from accessing its normal elimination area. Pain may also predispose an animal to anxiety and aggression. Loss of senses such as vision and hearing can contribute to anxiety in older pets. Pets with a loss of hearing or vision may also be either less responsive or more reactive to stimuli. A cat with no history of urine spraying may start to spray after developing hyperthyroidism. Even if one or more of these medical conditions is present, they don’t preclude CDS. All of the clinical signs need scrutinizing and then re-evaluated as medical issues are treated.

If a presumptive diagnosis of CDS is made, a treatment plan can be put into place. As mentioned earlier, the combination of a variety of antioxidants is very important. These are available in certain diets as well as supplements. Science Diet b/d (brain diet) is an excellent way to not only supply great nutrition but is also a great source of antioxidants. A medication by the name of “selegiline” is also very helpful for many animals. It is the only drug presently licensed in North America for the treatment of CDS in dogs. It is thought that one main effect is by restoring certain neurotransmitters within the brain (particularly Dopamine). It may also decrease free radicals in the brain. Selegiline and antioxidants can work synergistically together to improve the clinical signs and perhaps slow the progression of the disease.

It is also very important to continue to stimulate the pet’s brain with games, play, training, food puzzles, massage, olfactory stimulation and exercise. The “use it or lose it” concept applies not only to people but to animals as well. The increase in mental stimulation is probably helpful in keeping older dogs alert and engaged in their surroundings. Maintaining a normal weight (or acquiring a normal weight through calorie reduction) should not be overlooked as a way of preventing the production of damaging free radicals.

There is another drug available to treat CDS that are not yet licensed nor available for use in North America (Aktivait by Vet Plus). A more holistic approach may appeal to some owners. Ginkgo biloba and phosphatidylserine are two such possibilities. According to Gary Landsberg, there is some evidence in humans that Ginkgo biloba may improve some cases of Alzheimer’s disease or delay its progression. Phosphatidylserine may help to maintain certain

neurotransmitter levels (acetylcholine and dopamine). For a calming effect, reducing anxiety, and inducing sleep, other homeopathic and natural supplements may be helpful. These include melatonin, valerian, D.A.P. (dog appeasing pheromone), and Bach's flower remedies. Non-steroidal anti-inflammatory drugs may also prove helpful but studies have not been done, to date, to back up this claim.

Finally, since alterations in neurotransmitters can lead to behavior changes such as increased irritability, agitation, fear, decreased responsiveness to stimuli, and altered sleep-wake cycles, anti-depressants and anti-anxiety drugs may be helpful. Selegiline may help these types of behavior issues but if it does not, these drugs may be helpful.

Other available treatments include SAM-e (S-Adenosylmethionine). Novifit by Virbac is a relatively new pure and stable form of SAM-e for dogs. It is available in small, med, and large, depending on the size of the dog. They are enteric coated tablets that are taken on an empty stomach. ProNeurozone by Animal Health Options is available for both dogs and cats. It is a broad spectrum supplement containing antioxidants, vitamins, mitochondrial cofactors and fatty acids that may delay the development of age-related brain damage and memory loss. The latest addition to the veterinary market is Neutricks (Apoaequorin - a jelly-fish protein). This protein binds excess calcium. As dogs age there is a decrease of calcium binding proteins in the brain. Calcium regulation in the brain cells is important for cellular health. Neutricks replaces this protein. It is taken once a day and has been shown to significantly improve learning, accuracy and enhance attention. There are no known prescription medication or dietary supplement interactions. It is available only through licensed veterinarians. Lastly, Senilife, by CEVA Animal Health combines antioxidants with Phosphatidylserine, Pyrodoxine and Ginkgo Biloba. These ingredients work synergistically and have a specific neuroprotective action to protect against brain aging and improve the behavior signs that are often seen in senior pets.

We have come a long way in understanding Cognitive Dysfunction Syndrome, but we still have a long way to go. Research done for Alzheimer's disease helps us to understand CDS and conversely, research into CDS helps with understanding Alzheimer's. Hopefully, one day we will find a cure! If you think your pet may be suffering from cognitive dysfunction, schedule an exam with your veterinarian. The earlier the diagnosis and intervention the better the outcome.