

## Is There a Link Between Hearing Impairment and Dog Dementia?

You've noticed your older dog doesn't seem to hear as well as he used to. With humans, hearing impairment can be one of the biggest predictors of dementia. Is that so with dogs, too? Know the five classic signs of cognitive decline in dogs and five ways to help your pup stay mentally sharp.

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### STORY AT-A-GLANCE

- Recent research by North Carolina State University has established that as is the case with human seniors, there appears to be a connection between hearing loss and dementia in senior and geriatric dogs
- The study of 39 dogs, median age of 13 years, showed that a decreased ability to hear is closely associated with the onset of canine cognitive dysfunction (CCD)
- Of the dogs with normal hearing, 61% had no symptoms of CCD, while half of dogs with moderate hearing loss had moderate CCD symptoms, and of the dogs with severe hearing loss, none were CCD symptom-free, 38% showed moderate signs, and 50% had severe levels of CCD
- There are many things you can do to help preserve your aging dog's wellbeing and help her stay mentally sharp, including offering the right diet and supplements, encouraging regular exercise, skipping unnecessary vaccines, and scheduling twice-yearly wellness exams

Researchers at North Carolina State University published a study recently discussing a link between hearing loss and dementia in elderly dogs.<sup>1</sup> Their findings may provide a better understanding of the relationship between sensory loss and cognitive function in canine companions, and aid in the treatment of aging dogs.

*"In humans, we know that age-related hearing loss is estimated to affect one-third of people over age 65," NC State's Natasha Olby, senior author of the study, said in a news release.*

*"We also know that the rate of cognitive decline is approximately 30-40% faster in people with age-related hearing loss and that hearing loss is a greater contributor to dementia risk than other factors such as hypertension or obesity. But we don't understand whether the same holds true for dogs."<sup>2</sup>*

### How Hearing May Affect Cognition

As dog behavior expert and author Dr. Stanley Coren explains in his Canine Corner blog in Psychology Today:<sup>3</sup>

*"Why should hearing be linked to mental abilities? It [has] been suggested that this association comes about because sound interpretation and a lot of cognitive processing occur in the same areas of the brain. It is the temporal lobe of the brain that processes both auditory information and short-term memory storage. It is also often the first area to be affected by Alzheimer's disease.*

*It has been suggested that poor hearing can potentially lead to a progressive deterioration in this brain region. It works this way: A reduction in sound inputs to the brain results in the cortical cells being understimulated.*

*Since the brain often works on a "use it or lose it" principle, areas of the brain that are not well utilized will tend to shrink, cortical cells will die, and the efficiency of this part of the brain will be reduced. This may be happening in the temporal lobe of the brains of individuals with hearing [loss] simply because, in the absence of auditory inputs, it no longer has to work to understand sound.*

*It certainly seems likely that the same mechanism would apply to older dogs since age-related hearing decline also occurs in canines. Typically, canine hearing begins to diminish at approximately 8 to 10 years of age, with the greatest losses in the high frequencies followed by the middle frequencies of sound."*

## **NC State Study Involved 39 Healthy Older Dogs, Median Age 13**

Each dog was given auditory and cognitive tests. The auditory test used the BAER (Brainstem Auditory Evoked Response) method, which involves placing electrodes on the dog's head to measure electrical responses to sounds in the cochlear nerve and brain stem.<sup>4</sup> The dogs were divided into three groups based on their hearing ability:

1. No hearing loss (able to hear tones at 50 decibels (dBs) (19 dogs)
2. Moderate hearing loss (able to hear tones at 70 dB) (12 dogs)
3. Severely hearing impaired (only able to hear tones at 90 dB or louder — a noise level approximating that of a jet plane taking off) (8 dogs)

The dogs' owners completed two questionnaires — one focused on cognitive ability and the other on quality of life. The quality-of-life questionnaire included questions about vitality (e.g., energy level, maintaining interest in favorite activities), as well as quality of companionship, measured by things like showing a normal amount of affection and enjoying being petted and touched.

The cognitive ability questionnaire probed for symptoms of canine cognitive dysfunction (CCD), asking questions such as whether the dog appeared disoriented in familiar environments, had trouble recognizing familiar people or animals, or showed a reduced ability to remember and respond to previously learned commands.

## **Hearing Loss Presents a Quality-of-Life Issue for Older Dogs**

The researchers compared the dogs' hearing test results with their owners' responses on the quality-of-life questionnaire and discovered that scores related to vitality and companionship declined significantly as hearing deteriorated. In addition, cognitive questionnaire scores ranked all 8 of the dogs in the 90 dB group as abnormal, along with 9 of the 12 in the 70 dB group and 8 of the 19 in the 50 dB group.

Finally, the dogs' results from cognitive testing also showed that as hearing declined, so did the ability to perform tasks. Bottom line: A dog's hearing ability is closely associated with the onset of CCD.

- Of the dogs with normal hearing, 61% had no symptoms of CCD, 31% showed mild symptoms, and just 5% showed moderate cognitive decline

- Of the dogs with moderate hearing loss, 25% had no symptoms, with 50% showing moderate signs of CCD
- Of the dogs with severe hearing loss, 0% had no symptoms of CCD, 38% showed moderate signs, and 50% had severe levels of CCD

Studies in humans with age-related dementia often show that hearing loss is one of the largest risk factors, and this study certainly suggests a similar connection between hearing loss and cognitive decline in older dogs.<sup>5</sup> According to Olby:

*"Hearing loss is one of the biggest predictors of dementia in people. Hearing loss also contributes to falls in elderly people, as sensory decline contributes to a loss in motor skills. So the connection between physical and neurological decline is clear for humans.*

*This study indicates that the same connection is at work in aging dogs. But since we can potentially treat hearing loss in dogs, we may be able to alleviate some of these other issues.*

*By quantifying neurological and physiological changes in elderly dogs, we're not only improving our ability to identify and treat these issues in our pets, we're also creating a model for improving our understanding of the same issues in humans."*

Treating hearing loss in humans can be achieved with hearing aids, which in turn can delay or prevent dementia. Practically speaking, we can't take the same approach with canine family members, since the chances are slim to none they will tolerate tiny removable devices in or around their ears.

Another option being discussed is cochlear implants, which are becoming more commonplace in humans. However, the cost of implants for veterinary use would likely be prohibitive for most pet parents, at least for the foreseeable future.

## **Common Signs of Dementia in Dogs**

Signs of CDS occur in about half of dogs over the age of 11. By the age of 15, almost 70% have at least one sign of mental decline. Because large and giant breed dogs age more quickly than smaller breeds, dogs as young as six can begin to experience mental decline. If your dog is around that age, is a large or giant breed and is showing one or more symptoms of CDS, don't rule out an age-related problem. There are 5 classic signs of cognitive decline in dogs:

1. Increased total amount of sleep during a 24-hour period
2. Decreased attention to surroundings, disinterest, apathy
3. Decreased purposeful activity
4. Loss of formerly acquired knowledge, which includes housetraining
5. Intermittent anxiety expressed through apprehension, panting, moaning or shivering

Other symptoms include failure to respond to commands (possibly due to hearing loss), inability to recognize familiar people, and difficulty navigating the environment. Additional physical manifestations of CDS can include excessive licking, lack of grooming, fecal and urinary incontinence, and loss of appetite.

## 5 Ways to Help Your Dog Stay Mentally Sharp

Research shows mental decline in dogs can be improved by offering an antioxidant-fortified diet combined with a program of cognitive and environmental enrichment, plus extra exercise.

There are many things you can do to help your aging companion maintain good cognitive health for as long as possible and delay the onset and progression of cognitive dysfunction. Here are five of the most important steps you can take:

1. **Diet** — Feed a diet that is nutritionally optimal, species-specific, and rich in healthy fats, including phospholipid-rich omega-3 fatty acids such as krill oil. **Krill oil** and other healthy, unrefined fats, including **MCT oil**, are very important for cognitive health.

The perfect fuel for an aging dog is a variety of living, whole foods suitable for a carnivore. Eliminate all refined carbohydrates, which are just unnecessary sugar. Minimize grains, potatoes, or legumes. Replace those unnecessary carbs with extra high-quality protein and antioxidant-rich, brightly colored veggies. Eliminate extruded diets (kibble) to avoid the toxic byproducts of the manufacturing process that can damage brain tissue.<sup>6</sup>

Most pet foods are manufactured in a way that creates chemical byproducts that can affect cognitive health, including heterocyclic amines, acrylamides and advanced glycation end products, or AGEs. Fresh, biologically appropriate foods provide the whole food nutrients an aging brain requires.

A diverse, minimally processed, organic, GMO-free diet will also enhance the microbiome, which has been linked to improved cognitive health in humans, and I've seen an improvement in pets as well.

2. **Supplements** — Nutraceuticals can significantly improve memory, and the effects are long-lasting. Studies of medium-chain triglycerides (MCTs) such as coconut oil show they can significantly improve cognitive function in older pets.

MCTs provide an alternative energy source for the brain in the form of ketone bodies versus glucose, which can dramatically improve brain metabolism and cellular energy within the central nervous system.

Supplementing with MCTs is a great way to offer an instant fuel source for your dog's brain.

Ketone bodies cross the blood brain barrier to efficiently nourish aging brains. I recommend 1/4 teaspoon per every 10 pounds of your pet's body weight, added daily to his food. Your pet's brain is about 60% fat, and that fat needs to be appropriately fueled as he ages.

I also recommend providing a source of SAME (S-adenosylmethionine), which assists in methylation and other important metabolic functions as pets age. Another supplement to consider is resveratrol (Japanese knotweed), which has been proven to help reduce free radical damage and beta-amyloid deposits.

Ginkgo biloba may improve blood flow to the brain. Phosphatidylserine and **ubiquinol**, which is the reduced form of CoQ10, feeds your pet's mitochondria and improves cellular energy. Lion's Mane mushrooms have demonstrated excellent potential for slowing cognitive-related issues in many species and can be fed in supplement or whole-food form.

3. **Vaccines** — Over-vaccinating is something older animals absolutely do not need. You can replace vaccines with titers. A titer test is a blood test that measures protective immunity. Chances are your furry family

member is very well-protected. Switch to titering to help reduce her toxic load.

4. **Exercise** — Keep your dog's body and mind active with regular exercise appropriate for her age and physical condition, and mental stimulation (puzzles and treat-release toys can be beneficial). Provide her with daily opportunities to interact socially with other pets and people. Spending time sniffing outside can also enhance the level of "happy hormones" in your dog's body.

Also keep your furry companion at a healthy size. Overweight pets are at significantly higher risk for developing age-related diseases. Many older dogs benefit from rehabilitation therapies, including underwater treadmill and strengthening exercises, which help maintain lean muscle mass as they age.

Daily aerobic exercise is critical, as it helps keep blood glucose and insulin levels low, which research shows is critical for long term cognitive health.

5. **Senior wellness exams** — I recommend twice-yearly veterinary visits for pets no matter the age, but this becomes even more important for dogs who are getting up in years. Keeping abreast of your animal companion's physical and mental changes as he ages is the best way to catch any disease process early.

Ask your vet to perform a blood test to check your dog's internal organ health to make sure you're identifying possible issues early on.

When your dog begins to respond to therapy designed to improve cognitive function, if necessary, you can begin re-training him using the same techniques you used when he was a puppy or kitten — positive reinforcement behavior training involving lots of healthy treats and praise.

Unfortunately, these recommendations won't be tremendously helpful for an animal already in the advanced stages of cognitive decline, which is why it's so important to diagnose and begin treating the problem as early as possible.

Cognitive dysfunction is a progressive disease that can't be cured, but early diagnosis and intervention can slow mental decline and offer your aging dog a good quality of life.

## Sources and References

<sup>1</sup> [Fefer, G. et al. Journal of Veterinary Internal Medicine, Volume 36, Issue 5 September/October 2022, Pages 1708-1718](#)

<sup>2</sup> [NC State News, August 9, 2022](#)

<sup>3, 4, 5</sup> [Psychology Today, October 11, 2022](#)

<sup>6</sup> [Dei, R. et al. Acta Neuropathologica, Volume 104, Pages 113-122 \(2002\)](#)

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