

## Anesthesia

Anesthesia is an accepted support for treatment of dogs. As they age, dogs may need diagnostic examinations, surgery, and other forms of treatment that require anesthesia. It appears that the numbers of dogs and cats presented for anesthesia are increasing.

It has been suggested that the physiologic deterioration that occurs with age can cause complications during anesthesia. It has been estimated that the risk of anesthetic death increases several times for patients with ages greater than 12 years.

The risks associated with the use of anesthesia in geriatric dogs can be minimized through planning in the use of the procedure. Such planning should include patient preparation and careful monitoring. Geriatric animals have been found to have undiagnosed diseases that limit the use of the procedure.

Preparation for anesthesia should include a complete history, blood work, and diagnostic imagery where appropriate. Vigilant monitoring permits early intervention and correction of problems. Monitoring of dogs during anesthesia should include pulse oximetry, end-tidal CO<sub>2</sub>, blood pressure monitoring, electrocardiogram, and temperature.

It has been suggested a conservative approach to anesthesia is also helpful for geriatric dogs. This may involve reduction of doses by as much as 50 per cent to account for increased sensitivity, as well as reduced metabolism and excretion. The staging of procedures that involve anesthesia over time may also be useful. Local and regional approaches can also help reduce risk. Descriptions of specific types of anesthesia are contained in the links and articles that follow.

Baetge CL and Matthews NS. Anesthesia and Analgesia for Geriatric Veterinary Patients. *Veterinary Clinics of North America: Small Animal Practice* 2012, 42: 643-653.  
<http://dx.doi.org/10.1016/j.cvsm.2012.05.001>

Harvey RC, Paddleford RR. Management of Geriatric Patients: A Common Occurrence. *Veterinary Clinics of North America: Small Animal Practice* 1999, 29: 683-699. [http://dx.doi.org/10.1016/S0195-5616\(99\)50055-7](http://dx.doi.org/10.1016/S0195-5616(99)50055-7)

## Arthritis

Just like their human friends, dogs can suffer from osteoarthritis, a chronic condition that results in the breakdown of the cartilage that pads each joint. This process results in pain, inflammation, and decreased range of motion as the bones in the affected joints start to rub together. Certain risk factors, including obesity, genetics, previous injury, and increasing age, make some dogs more prone to developing this condition. This is often a progressive disease that worsens slowly over time. Initially, the signs can be subtle; an agile run becomes a stiff trot, bounding up the stairs reduces speed to calculate each step, and laying down or standing up becomes slow and accompanied by groaning. As osteoarthritis advances, many dogs are unable to jump onto a couch or into a car, their muscles atrophy and they may become lame.

From what is known about osteoarthritis in people, dogs with the condition appear to be in pain, often severe pain, yet many of them will not vocalize. There is no cure for osteoarthritis in dogs. It is a disease that must be managed for the remainder of the dog's life. Veterinarians will make a diagnosis of arthritis in dogs based on reports of "slowing down" at home, loss of muscle mass and range of motion in joints on physical exam, and arthritic changes seen on an x ray.

There are many options available to improve the comfort of dogs suffering from this condition. Often, the most successful strategies are multimodal approaches to decreasing pain and inflammation while increasing the range of motion in the joints.

#### In the home

- Minimize slipping on slick floors by providing additional mats and throw rugs .
- A variety of ramps and stairs can be made or purchased to aid in getting on or off furniture
- Provide well padded bedding away from cold or damp drafts.
- Maintain a low impact exercise routine to keep a good range of motion in the joints and muscles from weakening. Short walks and swims go a long way.
- Staying trim – if a dog has osteoarthritis and is overweight, a healthy weight reduction plan is crucial.
- Help 'em Up Harness - allows owners to aid their dogs physically in moving around while minimizing the stress they are putting on their own joints . [www.helpemup.com](http://www.helpemup.com)

#### Non-pharmaceutical options and supplements

- Veterinarian recommended joint supplements to promote healthy cartilage include glucosamine and chondroitin, such as Dasuquin, as well as Omega – 3 Fatty Acids, such as Welactin ([www.nutramaxlabs.com](http://www.nutramaxlabs.com))
- High quality diet that supports joint health including Hill's j/d([www.hillspet.com](http://www.hillspet.com)) and Royal Canin Mobility ([www.royalcanin.us](http://www.royalcanin.us))
- Laser Therapy – Class IV lasers use light energy to accelerate the body's natural healing processes and reduce pain and inflammation.
- Acupuncture and massage.

#### Pharmaceuticals

There are many pharmaceuticals available to relieve pain in arthritic dogs, however, they are not without side effects and should not be given casually. Often, the drugs used for osteoarthritis and their side effects can be minimized when dogs are diagnosed early in the disease process and when other therapies listed above are used. Please consult your veterinarian before using a drug regimen with your

dog and NEVER give over-the-counter pain relievers, including aspirin, without discussing them with a Veterinarian first.

Links

For more information concerning the management of arthritis in dogs, please refer to the following Links.

[www.veterinarypartner.com/Content.plx?P=A&S=0&C=0&A=587](http://www.veterinarypartner.com/Content.plx?P=A&S=0&C=0&A=587)

For more general information, visit [www.veterinarypartner.com](http://www.veterinarypartner.com) and search using arthritis

For veterinary appointments with Dr. Lauren Passantino, the author of this section, refer to [info@ww](mailto:info@ww)

## Cancer

Advances in the care of animals have allowed dogs to live longer. The improved general health of dogs and other pets has resulted in an increase in age related diseases, including cancer. This may be related to a rise in the incidence of cancer and an increase in the population of dogs at risk for development of the disease.

Malignant diseases of various organs affect elderly dogs. It has been estimated that one in four dogs aged more than 2 years dies from cancer. The prevalence of cancer in dogs has increased during recent years. Cancers most commonly encountered include Mast cell tumors (which involve the skin), lymphomas, osteosarcomas ( involving the bones of large dogs), and hemangiosarcoma (involving the spleen). Tumors less frequently encountered in dogs involve the mammary gland, bladder, prostate, lung, and brain.

Many of these cancers can be treated effectively if diagnosed early. The use of pathology to identify and evaluate tumors in dogs has evolved rapidly in recent years. Diagnostic laboratories can provide more specific information concerning the lineage of these conditions. The use of imaging techniques, including ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI), has also expanded. These tools can frequently show the extent of a growth and help identify treatment options.

In order to address these diseases as soon as possible, dog owners should be aware of potential warning signs. Followup by a veterinarian can help determine the causes of these symptoms.

- Loss of appetite
- Difficulty eating
- Unexpected weight loss
- Unexplained swelling
- Bleeding/discharge from body openings
- Difficulty breathing, urinating, or defecating
- Persistent loss of stamina
- Persistent stiffness

- Offensive odor

The treatment of malignant disease in dogs has also evolved rapidly in recent years. Many surgical procedures including wound reconstructions are available in general practices. Specialist procedures such as facial, tracheal, rib, pelvic, prostate, and limb salvage options are available in referral center animal hospitals.

The use of chemotherapy has expanded dramatically in recent years. More practitioners have become familiar with the use of existing generic medications and cytotoxic medications in community practices. Newer medications have also been developed for treatment of malignant disease in dogs and other animals. Referral center hospitals provide access to many of these drugs.

The use of radiation therapy in oncology for dogs has also expanded. Access to facilities with this modality has improved, providing more treatment options and extended survival times.

For additional information concerning the treatment of cancer in geriatric dogs, refer to the following articles.

Paolini M. C, Khanna C. Comparative Oncology Today. Veterinary Clinics of North America Small Animal Practice 2007, 37 (6): 1023-1035. <http://dtp.doi:10.1016/j.cvsm.2007.08.003>

Morris J. Advances in small animal oncology. Journal of Small Animal Practice 2006, 47 (9): 501-02. <http://dx.doi.org/10.1111/j.1748-5827.2006.00219.x>

Extensive information concerning oncology in dogs can be found at [www.vetcancersociety.org](http://www.vetcancersociety.org)

In Central New York, some surgical procedures and medications that can be used to treat cancer in elderly dogs are available from community veterinarians.

The Cornell University Animal Hospital Department of Oncology provides state of the art chemotherapy and radiation therapy for dogs at the facility. Surgical removal of tumors is available at the facility. The Department also provides advice to community veterinarians.

The Department can be reached at 607 253 3060.

## **Dementia**

Canine cognitive dysfunction, also known as canine dementia, occurs in aging dogs. Symptoms include disorientation, changes in interaction with owners, other pets, and the environment; sleep-wake cycle changes; urinating or defecating in the house; and alterations in activity. Memory deficits have been identified as early signs of brain aging in dogs, however, these symptoms are sometimes difficult to identify in dogs with high levels of training.

The prevalence rate for this disease in dogs has been estimated at 12 to 75 percent. It has been suggested that a much lower percentage of dog owners report the symptoms of the disease to veterinarians.

Recent clinical criteria have suggested that there are progressive stages of dementia. These range from a preclinical stage, before symptoms appear; to mild cognitive impairment; to a clinical diagnosis based on visible symptoms. The fact that the last stage occurs when symptoms are apparent may explain why therapies for dementia have only limited success.

The diagnosis of cognitive dysfunction in older dogs is made difficult because of other medical conditions that develop with age. Medications can also affect the behavior of dogs at this age level. This process can be approached by excluding symptoms that result from causes other than dementia.

Addressing cognitive dysfunction in elderly dogs may involve the following therapies.

Behavioral studies have shown that mental support is an important component of maintaining cognitive function. This support may involve management of the dog's environment to reduce stress. It may include providing ramps and cues that help the dog make more frequent trips outdoors, or even the addition of an indoor toilet area. Enhanced activity during the day that results in mental stimulation is also useful.

Drug therapy in dogs focuses on slowing deterioration and improving clinical signs. A number of medications, identified in the Landsberg et al article below, have been evaluated. For each of them, potential benefits must be weighed against potential risks.

Nutritional and dietary interventions have also been shown to support cognitive function in elderly dogs. These include antioxidants, triglycerides, and some dietary supplements. Additional information about a number of them is summarized in the Landsberg et al article referenced below.

Additional therapies addressing anxiety and night waking in elderly dogs have also been identified. These have included a number of drugs and natural remedies such as Melatonin.

For more information about cognitive dysfunction in elderly dogs, consult the following articles.

Landsberg G. M., Nichol J., Arujo J. A. Cognitive Dysfunction Syndrome: A Disease of Canine and Feline Brain Aging. *Veterinary Clinics of North America: Small Animal Practice* 2012, 42: 749-768. <http://dx.doi.org/10.1016/j.cvs.2012.04.003> .

Salvin H. E., Greevy P. D., Sachdev P. S., Valenzuela M. J. Under diagnosis of canine cognitive dysfunction: A cross sectional study of older companion dogs. *The Veterinary Journal* 2010, 184: 277-281.

<http://dtp.doi:10.1016/j.tvjl.2009.11.007>

Examination and treatment of dementia by a specialist is advisable because of the range and complexity of this condition. The Department of Neurology of the Cornell University Hospital for Animals includes Board Certified Neurologists who are able to diagnose and treat dementia in dogs.

The Department can be reached at 607 253 3060.

## **Dental Disease**

Dental care is important for optimum health and quality of life in dogs. Addressing and treating dental disease in senior and geriatric dogs is necessary to enhance their overall health and well being.

Up to 85 percent of dogs have some form of periodontal disease by age 3. By the time they are senior or geriatric dogs, if they have not received regular dental care, this problem will likely become much worse. Diseases of the oral cavity, if left untreated, are often painful and contribute to other oral and systemic diseases.

Comprehensive dental care, especially in elderly dogs, should include examination by a veterinarian. General anesthesia is required for a thorough oral examination, including dental radiographs, and for appropriate periodontal treatment. Age alone is not a reason why anesthesia should be avoided. Even with some systemic problems in older dogs, anesthesia can be safely administered with careful preparation and monitoring. Pet owners should discuss hospital policies for minimization of anesthetic risk with their veterinarians.

Treatment of dental disease in geriatric dogs will be determined based on the oral examination and dental radiographs. Such treatment can include ultrasonic scaling and polishing, surgical extractions, or endodontic therapy (root canals and restorations which must be performed by a veterinary dental specialist).

Pet owners can provide basic dental care at home in the form of tooth brushing. Remember that a physical/oral examination must be performed on each dog prior to instituting home care. Brushing teeth that already have gum disease or are fractured can be very painful. As long as the veterinarian has given approval, follow the steps outlined in the following video (Youtube How to Brush Your Dog's Teeth Vet Vid Episode 007).

In brushing your dog's teeth, be sure to use toothpaste designed for animals only (NEVER human toothpaste), and brush the outside surfaces of the teeth daily. It is not necessary to brush the inside surfaces. CET toothpaste is an enzymatic pet toothpaste that comes in several flavors and is well tolerated by most dogs ([www.virbacvet.com](http://www.virbacvet.com)). Various chews, wipes, and rinses are also available. Check with your veterinarian to ensure that these are ok for your pet.

For more information, visit [www.veterinarypartner.com](http://www.veterinarypartner.com) and search using dental care.

## Digestive Disorders

Health of the digestive system is an important consideration for the senior dog. As dogs age, a number of digestive problems are encountered more frequently. Empowering pet owners with knowledge of such diseases, particularly how to recognize their signs, will aid in early recognition of a developing condition. Early recognition by owners frequently hastens diagnosis, and thus appropriate treatment can be started as soon as possible. An accurate diagnosis will also aid in providing a prognosis for their pet.

While younger dogs are more likely to suffer from acute illnesses of the digestive tract, the senior dog is more prone to chronic inflammatory conditions, cancers, and other conditions. The signs of many of these diseases are similar and include vomiting, diarrhea, changes in appetite, bloating, jaundice, and weight loss. Dogs exhibiting these signs should be evaluated by a veterinarian. The urgency of this evaluation depends on the severity of signs and can often be determined by calling your dog's primary veterinarian. Whenever in doubt, owners should err on the side of caution and have their pet evaluated as soon as possible.

Organs and structures that make up the digestive tract include the mouth, esophagus, stomach, intestines, pancreas, and liver. A disease in any of these locations can lead to digestive problems. Dogs that are unable to eat effectively or sufficiently due to oral disease may exhibit weight loss, for example. Stomach and intestinal diseases may cause many of the signs above. Pancreatitis is a disease that is seen more frequently in middle aged to older dogs and often involves vomiting and abdominal pain. The types of diagnostic test performed to determine the type of digestive disease will depend on a number of factors, including the physical exam findings and the patient's history.

If signs are mild and there is no history of a long-standing disease in a pet, supportive care may be considered in some cases with minimal diagnostic testing. Dogs with more chronic diseases or severe disease often require more diagnostic testing to most accurately determine the patient's disease and to optimize treatment.

For additional information concerning digestive disorders in geriatric dogs, please consult the following.

Hackett TB. Gastrointestinal complications of critical illness in small animals. *Veterinary Clinics of North America: Small Animal Practice* 2011, 41 (4): 759-66.

<http://dx.doi:10.1016/j.cvsm.2011.05.013>

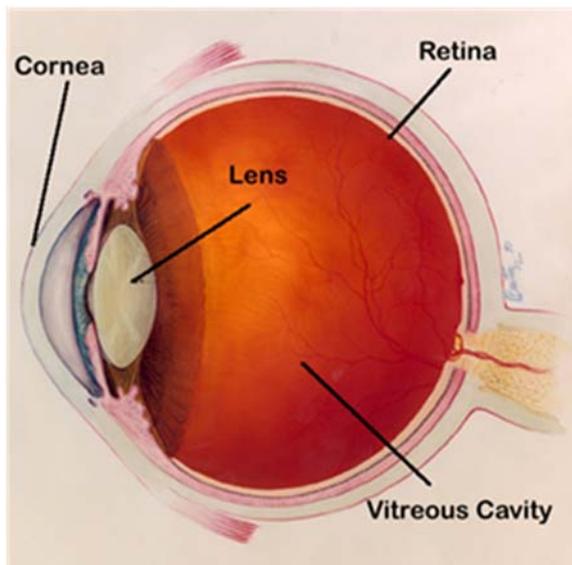
Jergens AE. Gastrointestinal disease and its management. *Veterinary Clinics of North America: Small Animal Practice* 1997, 27 (6): 1373-1402. [http://dx.doi:10.1016/S1095-5616\(97\)50131-8](http://dx.doi:10.1016/S1095-5616(97)50131-8)

The Internal Medicine Service at the Cornell University Hospital for Animals includes multiple Board Certified Internists who are able to diagnose and treat your pet's gastrointestinal conditions.

The service can be reached at 607-253-3060.. More information can be found online at <http://www.vet.cornell.edu/hospital/Services/Companion>

## Eye Disorders

Geriatric dogs can develop a variety of ocular changes. The most common are those related to a change in transparency in the canine lens.



*Source: google images*

The purpose of the lens is to refract incoming light rays to a point source on the retina. The retina then transmits information to the brain for vision processing. Loss of transparency of the lens can therefore interfere with functional vision.

### Senile nuclear sclerosis

Dogs develop senile (age-related) nuclear sclerosis when the center part (nucleus) of the normally clear lens becomes slightly cloudy (gray), but not opaque. Light is still successfully transmitted to the retina. This occurs in just about every dog over the age of 7 years! The change is a result of continual lens fiber development throughout life and internal compression of the older lens fibers (in the nucleus). Owners may report subtle "clouding" of the eyes without much noticeable change in vision. Occasionally, difficulty with near-vision is reported. The effect on vision is suspected to be minimal, unless dogs develop concurrent cataracts.

No treatment is necessary, though dogs with advanced nuclear sclerosis plus cataracts will benefit from cataract surgery.

## **Cataract**

Dogs develop cataracts when the normally clear lens becomes truly opaque (white) and light is unable to pass through the lens to reach the retina. Cataracts may affect anywhere from a small spot within the lens to the entire lens. Dogs that have more progressed cataracts are commonly presented for blindness or visual difficulty (bumping into objects, etc.). Owners may also notice ocular cloudiness. Other times owners may note a general decrease in activity level of their older pet that is not immediately recognized as due to visual impairment.

Cataracts may be senile (age-related), inherited, post-traumatic, post-inflammatory, nutritional, or metabolic. Most diabetic dogs develop secondary blinding cataracts. If left untreated, some cataracts may result in painful inflammation (uveitis) and elevated intraocular pressure (glaucoma).

Unfortunately, there are no proven or approved medical treatments like drops or pills to prevent, retard, or reverse cataract development. Thankfully, however, cataract surgery in dogs has a high success rate for restoration of vision. Pre-operative evaluation of the retina through electroretinography (ERG) and ocular ultrasound is required to ensure best visual results. The procedure performed is the same basic procedure as in human cataract surgery. The opacified, white lens is removed and an artificial lens implant is placed, just as in people. Vision is restored immediately after surgery and recovery time is generally 3-6 weeks as the incision heals.

### ***How to know if your pet has nuclear sclerosis or cataracts?***

A consultation with a veterinary ophthalmologist is recommended. The ophthalmologist will shine a light in each eye and determine if the back of the eye is still visible via a technique called indirect ophthalmoscopy. If it is not, the lens has a true opacity (cataract). If the ophthalmologist can still clearly visualize the back of the eye despite a cloudy lens, it is more likely to be nuclear sclerosis.

Often times dogs have a combination of both nuclear sclerosis and cataract. The ophthalmologist can help determine whether your pet will benefit from cataract surgery.

### ***Corneal endothelial degeneration***

The cornea is the clear, outer layer of the eye. Older dogs may develop a blue, cloudy haze to their corneas. This is due to the build-up of fluid within the cornea that is due to degeneration of the corneal endothelium (inner lining) with age. Normally, the endothelium has a delicate pump mechanism to prevent fluid buildup within the cornea. This problem is usually not a major issue for vision, although visual acuity/clarity may be slightly decreased as if your pet were looking through a frosted glass window. There is unfortunately no treatment that can reverse age-related degeneration of the corneal endothelium. Occasionally, application of topical concentrated salt

(sodium chloride 5%) ointment can help osmotically remove some fluid from the cornea and reduce cloudiness.

For additional information on ocular disorders in geriatric dogs, please consult the following:

<http://animaleyecare.net/diseases/cataract/>

<http://www.petloverscompanion.com/geriatric-changes-in-the-eyes-of-dogs-and-cats/>

Fischer CA. Geriatric ophthalmology. *Veterinary Clinics of North America: Small Animal Practice* 1989, 19(1): 103-23.

Glaze MB. Ophthalmic disease and its management. *Veterinary Clinics of North America: Small Animal Practice* 1997, 27(6): 1505-22. [http://dx.doi.org/10.1016/S0195-5616\(97\)50136-7](http://dx.doi.org/10.1016/S0195-5616(97)50136-7)

(Textbook) Gelatt KN, Gilger BC, Kern TJ. *Veterinary Ophthalmology Volumes 1 – 2*. Ames, Iowa: Wiley-Blackwell, 2013. <http://www.worldcat.org/title/veterinary-ophthalmology-vol-1-and-vol-2/oclc/836403254>

(Textbook) Gelatt KN. *Essentials of Veterinary Ophthalmology*. (Third Edition) Ames, Iowa: Wiley-Blackwell, 2014. <http://www.worldcat.org/title/essentials-of-veterinary-ophthalmology/oclc/881387613>

The Ophthalmology Service at the Cornell University Hospital for Animals includes multiple Board Certified Ophthalmologists who are able to diagnose and treat your senior pet's ocular conditions.

The Ophthalmology Service can be reached at 607-253-3060. More information can be found online at <http://www.vet.cornell.edu/hospital/Services/Companion/Ophthalmology/>

This section was developed by Michele Edelmann, VMD of the Department of Ophthalmology at the Cornell University Hospital for Animals.

## **Neurologic Disorders Except Dementia**

Geriatric dogs can develop a number of neurologic disorders. Brief descriptions, including diagnosis and treatment options, follow.

### **Idiopathic Vestibular Disease**

In dogs, this condition is sometimes known as Old Dog Vestibular Disease. Symptoms can include leaning to one side, circling (walking in circles) and an ataxic gait. The onset of the disease may occur within 24-48 hours. It may then stabilize and improve over several weeks. Some symptoms, such as a head tilt, may remain. The causes of this disorder are unknown.

Diagnosing the condition requires ruling out disorders of the ear (such as infections) and other causes of vestibular dysfunction. These may include advanced imaging such as magnetic resonance imaging (MRI) and computed tomography (CT). Treatment is supportive to help the patient through the vestibular event. Dogs may recover over a period of weeks, but the condition may recur.

### Intervertebral Disc Disease (IVDD)

Older dogs, especially dachshunds, beagles, pekingese, poodles, and some other breeds are at risk for intervertebral disc disease. This disease also affects young and middle aged dogs. The causes of this condition may be biochemical, morphologic, and genetic changes that lead to degeneration of the intervertebral discs. The intervertebral discs are located between each vertebral body, except the first and second cervical vertebrae. The disc is composed of a fibrous ring on the outside surrounding a gelatinous layer. Intervertebral disc degeneration occurs as part of a normal aging process. The symptoms can vary from spinal pain to difficulty using the limbs and progress to paralysis.

IVDD is diagnosed with advanced imaging, such as MRI and CT scans. Options for treatment include medical management and surgery, depending on the history and severity of clinical signs. Medical management typically consists of crate rest for 4-6 weeks, combined with analgesic and anti-inflammatory medications. If surgical decompression is required, the exact surgical procedure performed will depend on the location of the compressive lesion as well as various other factors.

### Vascular Events

Cerebrovascular disease in animals and humans involves conditions which compromise the supply of blood to the brain. In animals and humans, these conditions include ischemic and hemorrhagic strokes. An ischemic stroke results from the blockage of a blood vessel that deprives the brain of oxygen and nutrients. A hemorrhagic stroke results from the rupture of a blood vessel within the brain.

Ischemic strokes in dogs are most commonly associated with hypertension, kidney, and thyroid disease. They are usually associated with loss of function, especially abrupt loss of function. If the stroke is not fatal, the loss of function plateaus. Symptoms usually improve after 24 – 72 hours. Most dogs with ischemic stroke recover in several weeks with only supportive care. Nursing management involves prevention of decubitus ulcers, aspiration pneumonia, and urinary problems.

Hemorrhagic strokes are relatively rare in dogs. They involve the rupture of blood vessels and leakage of blood onto the brain. They frequently involve more than one area of the brain and more general signs than ischemic strokes. Therapy involves monitoring and stabilization of the patient and treatment of underlying causes.

The diagnosis of ischemic and hemorrhagic strokes is best carried out with CT or MRI scans. These tools are available at large veterinary hospitals and clinics.

For additional information concerning neurologic disorders in old dogs with respect to each of the conditions identified above, consult the following.

Rossmeisl J H. Vestibular Disease in Dogs and Cats. *Veterinary Clinics of North America: Small Animal Practice* 2010, 40: 81-100.  
<http://dtp.doi:10.1016/j.cvsm,209.09.007>

Garosi L. S. Cerebrovascular Disease in Dogs and Cats. *Veterinary Clinics of North America: Small Animal Practice* 2010, 40: 65-79.  
<http://dtp.doi:10:1016/j.cvsm.2009.09.001>

Dewey, C. W. *A Practical Guide to Canine and Feline Neurology*. Hoboken: Wiley, 2013.  
<http://www.worldcat.org/title/practical-guide-to-canine-and-feline-neurology/oclc/854971756>

Sorjonen D.C. Neurologic and Otologic Disorders of Geriatric Patients. *Veterinary Clinics of North America: Small Animal Practice* 1989, 19: 125-135.

Examination and treatment by a specialist is advisable because of the range and complexity of neurologic conditions. The Department of Neurology of the Cornell University Hospital for Animals includes Board Certified Neurologists who are able to diagnose and treat these conditions.

The Department can be reached at 607 253 3060.

## **Nutrition**

Proper nutrition is an essential component of any senior pet's health. As dogs age, their requirements for certain nutrients can change. However, as pets age, the incidence of certain diseases that may require a special diet increases. Therefore, each senior pet would benefit from an individual nutritional assessment. Consideration of specific diseases should take priority before general principles of senior dog nutrition are implemented.

Common diseases of senior dogs that may require special veterinary therapeutic diets include advanced arthritis, kidney disease, obesity, gastrointestinal diseases and heart disease. Each of these diseases has specific nutrient requirements to optimize the health of the patient. Many of the therapeutic diets for these diseases also have characteristics that generally benefit the senior dog.

As dogs age, they typically require more protein to maintain optimal health than when they were younger. As such, caution should be used when choosing a lower protein "senior diet" for your dog. Generally, lower protein diets are appropriate for dogs with kidney disease and certain types of liver disease. It is important to note that high protein diets do not cause kidney disease, and lowering dietary protein in a senior pet is not an appropriate measure for prevention of kidney

disease. You should consult with your veterinarian to help determine the best level of dietary protein for your pet.

Maintaining an ideal body weight and good muscle tone benefits all senior pets. Energy requirements typically decrease with age and therefore, care should be taken to adjust food amounts to prevent senior pets from becoming overweight or obese. Additional fatty acids and antioxidants may also be beneficial to help reduce the side effects of aging. Although the role of essential fatty acid and antioxidant supplementation in diet of the aging dog remains unclear, when dosed appropriately there is rarely any detriment to their supplementation.

For additional information concerning nutrition for geriatric dogs, consult the following articles.

Larsen J A and Farcas A. Nutrition of Aging Dogs. *Veterinary Clinics of North America: Small Animals* 2014, 44: 741-759.

<http://dx.doi.org/10.1016/j.cvsm.2014.03.003>

Fahey G C, Barry K A, Swanson K.S. Age-Related Changes in Nutrient Utilization by Companion Animals. *Annual Review of Nutrition* 2008.28:425-445.

<http://dx.doi.org/10.1146/annurev.nutr.28.061807.155325>

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