

# Deafness in Animals

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## Key Points | For More Information

Deafness—the absence of perception of sound—and reduced hearing are common in dogs and cats, and to a lesser extent in other species. Deafness can be hereditary or acquired, congenital or later onset, and sensorineural or conductive. **The most common cause of deafness in dogs and cats is congenital and hereditary, associated with white pigmentation.** Adult and geriatric animals are most likely to be affected by otitis, drug toxicity, noise trauma, and presbycusis.

**Hereditary deafness**, usually congenital, can be either cochleosaccular or neuroepithelial in origin. Cochleosaccular deafness in dogs is usually seen with the piebald or merle genes and in cats with white coat color. It produces deafness in one or both ears and is often associated with blue eyes and white pigmentation. Affected ears are totally deaf. Pigment-associated deafness also occurs in equine, bovine, porcine, and other species. **Hereditary deafness is the most common cause of deafness in dogs and cats and should be the first differential diagnosis considered in an animal with any white pigmentation.**

The condition develops within 1–3 weeks after birth secondary to stria vascularis degeneration that results from the suppression of melanocytes by the pigment gene, leading to cochleosaccular neuronal degeneration. Unilaterally deaf animals may go undetected without brain stem auditory evoked response (BAER) testing but will pass on an increased deafness risk to offspring if bred; inheritance is not simple autosomal.

Neuroepithelial deafness is not associated with pigment patterns, is usually bilateral, and results from primary hair cell loss over the same time course as cochleosaccular deafness but without affecting the stria vascularis. Vestibular signs may also be present (eg, in Doberman Pinschers).

Hereditary deafness occurring in midlife has been documented in several dog breeds (Border Collie, Rhodesian Ridgeback) but the pathology and mechanism of inheritance have not been documented.

**Congenital deafness** (usually hereditary) has been **reported in more than 100 dog breeds** and is especially prevalent in the piebald-carrying breeds of **Dalmatian, Dogo Argentino, Catahoula Leopard Dog, Bull Terrier, Australian Cattle Dog, English Setter, English Cocker Spaniel, Boston Terrier, and Parson Russell Terrier**, and in the different merle-carrying breeds. The prevalence of deafness in **white**

**cats** (dominant white gene), especially those with blue eyes, is high, but blue-eyed cats from Siamese breeds do not appear to be affected.

No DNA testing is currently available to identify carriers of genetic deafness in dogs or cats, so BAER testing and informed selective breeding are the only available options to reduce prevalence within breeds. Two causative genetic mutations have been reported in Doberman Pinschers.

**Conduction deafness** results from obstruction or reduction of sound reaching the cochlea, usually from [otitis media](#), chronic [otitis externa](#), or excess cerumen, and less commonly from tympanum rupture or ossicle damage. Resolution of the obstruction or tissue damage usually restores hearing. Recovery after otitis media may require weeks while the body phagocytizes the infection residue, accompanied by progressive recovery of hearing. Primary secretory otitis media (glue ear), especially in Cavalier King Charles Spaniels, produces a persistent conductive deafness that may be treated by myringotomy, bulla osteotomy, or tympanostomy tubes. Ear canal resection will result in reduced hearing but does not necessarily result in complete deafness.

**Sensorineural deafness** results from loss of cochlear nerve (hair) cells and is not reversible in mammalian species. Hearing aids have proven to have limited effect. Acquired sensorineural deafness may result from intrauterine infection or toxins, otitis interna or meningitis, mechanical or noise trauma, ototoxicity, anesthesia, neoplasms, or aging (presbycusis). Loss can be bilateral or unilateral, and partial or complete. [Otitis interna](#) will frequently be accompanied by vestibular signs such as head tilt and circling. Hunting or military dogs exposed to loud percussive sounds such as gunfire experience cumulative losses that may initially go unnoticed. This is often observed in hunting dogs, in which the distance at which a trained dog responds to commands shrinks by half or more. Hearing protection devices are available.

A variety of drugs and chemicals are ototoxic and vestibulotoxic, especially the aminoglycoside antibiotics (gentamicin, amikacin), antineoplastic drugs (cisplatin), salicylates, diuretics (ethacrynic acid, furosemide), and antiseptics (chlorhexidine). The damage from toxicity is usually permanent. Aminoglycoside toxicity is the most common. High frequencies are affected first, slowing recognition of the toxicity, which may appear at a delay of weeks after drug treatment has been discontinued. Dogs or cats undergoing general anesthesia for teeth or ear cleaning occasionally awaken bilaterally deaf, but the mechanisms, which can be conductive or sensorineural, are unknown. Few reports have been seen for procedures on body regions other than mouth and ear, and no unilateral deafness from anesthetic procedures has been reported.

Many **geriatric** animals develop **presbycusis**. Mid to high frequencies are affected first, followed by progressive loss at all frequencies. The loss may appear to be acute in onset but reflects the animal's eventual inability to compensate for the progressive loss that had been developing for some time. There does not appear to be a gender difference in prevalence. Onset is typically in the last third of a breed's typical lifespan and will progress to complete deafness if the animal lives long enough.

Unilaterally deaf animals show few signs, primarily an inability to localize sound origins and orienting toward the good ear, but many compensate and show no signs. Bilateral orienting pinnae movements persist in unilaterally deaf animals. Bilaterally deaf animals do not respond to sound stimuli but become adept at increased attention to other senses such as vision and vibration. Affected animals "key" off the behavior of littermates or other household pets. Breeders of dog breeds with high prevalence often choose to euthanize bilaterally deaf (and spay/neuter unilaterally deaf) animals because of a frequent outcome of poor quality of life and liabilities from owning a deaf dog, such as startle biting. Bilaterally deaf dogs can be

successfully raised, but more dedication than normal is required. Obedience hand signals and sign language have been used successfully to improve communication. Owners of deaf dogs should be counseled to protect their pets against undetected dangers such as motor vehicles.

Dogs that lose hearing later in life appear to cope well but on occasion exhibit transient behavior suggestive of auditory sensations similar to subjective tinnitus in people. There is no evidence that deaf animals otherwise experience pain or discomfort from the condition.

Identification of deafness is most accurate with **BAER testing** at referral centers, but behavioral testing is typically used in the clinic. Observations are made for a response to a sound stimulus outside the animal's visual field. Limitations to behavioral testing include the inability to identify unilateral deafness, stimulus detection through other senses, blunted responses in stressed animals, and failed responses from expired novelty of a repeated stimulus. Failure of a sleeping animal to waken to an auditory stimulus that does not activate other senses is a suggestive indicator of bilateral deafness in the home environment.

Otoscopic examination of the external ear and tympanum, radiography of the tympanic bullae, and neurologic examination may reveal the cause, especially in conduction deafness, which usually responds to appropriate medical or surgical treatment. Early intervention in ototoxicity may reduce or reverse loss but usually is not successful. Once developed, sensorineural deafness cannot be reversed, and its cause cannot be determined. Congenital deafness in breeds with white pigmentation is nearly always of genetic origin.

## Key Points

- Most deafness in dogs and cats is congenital and hereditary, associated with white pigmentation and blue eyes.
- Sensorineural deafness is irreversible, whereas conductive deafness will frequently resolve.
- Hearing loss in middle to late life usually results from otitis, ototoxicity, noise trauma, or presbycusis.

## For More Information

- [Referral centers that perform BAER \(hearing\) testing](#)
- Also see pet health content regarding [deafness in dogs](#), [deafness in cats](#), and [deafness in horses](#).