

Your Pet & CONGENITAL DEAFNESS



Registered charity no. 209642

When no waveform is present in either ear, the dog is bilaterally deaf. In such cases, the deafness is complete, ie there is no 'partial hearing' in this case, and any perceived hearing by the owner is probably due to the dog's reaction to cues picked up by other senses, such as vibrations or scent.

There is unfortunately no treatment for congenital deafness, and although bilaterally deaf dogs may represent a liability to themselves and others, unilaterally deaf dogs make perfectly acceptable pets.

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The Animal *Health* Trust is an internationally recognised centre of excellence in the field of veterinary medicine.

It has pioneered many breakthroughs in relation to improving the prevention, diagnosis and treatment of animal disease and injury and is entirely dedicated to improving the health and welfare of cats, dogs and horses.

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Your Pet

CONGENITAL DEAFNESS



How does hearing work?

Sound waves enter the ear canal and strike the eardrum which, in turn, causes vibration of the tiny bones in the middle ear. This sets up waves in the fluid of the cochlea, the spiral-shaped structure in the inner ear, causing movement of the hair cells inside the cochlea and sending a nerve impulse through the auditory pathway to the brain.

What is deafness?

Interruption in the delivery of sound to the brain causes one of several types of deafness. Conductive deafness is due to interference in the transmission of sound waves to the inner ear, eg due to a foreign body in the ear canal, rupture of the ear drum or infection in the middle ear. Sensorineural deafness results from damage or defect in any part of the nervous tissue from the cochlea in the inner ear, via the auditory pathway to the brain. Dogs with congenital deafness are born deaf as opposed

to those with acquired deafness, such as that associated with old age. Inherited deafness is passed down through one or both parents, whereas acquired deafness is due to external factors such as injury or disease.

What causes congenital deafness in dogs?

Congenital deafness is often associated with the gene that causes merled coat colour, for example in the Border Collie, Shetland Sheepdog or Harlequin Great Dane. Absence of pigment in one or both eyes causing blue eye colour may also occur in merle dogs. In breeds where the merling gene is not reported, blue eyes may still be present. A link between blue eyes and deafness has been suggested, supported by recent information from the USA, where a relationship between deafness and blue eyes has been shown in the Dalmatian. This may also be true of other breeds. Predominantly white coat colour is likewise thought to predispose certain breeds to deafness, for example in the Boxer or English Bull Terrier.

The congenital deafness suffered by Dalmatians is due to failure of the blood supply to the cochlea in the first few weeks of life, which causes degeneration of the hair cells. The loss of the hair cells is permanent and irreversible. Affected puppies can be detected from as early as 4 weeks of age. Deafness may occur in both

ears (bilateral deafness) or in one ear only (unilateral deafness). Congenital deafness in other breeds is usually also due to this type of hair cell degeneration.

Which breeds are susceptible to congenital deafness?

Over 80 breeds have been reported as suffering from congenital deafness, and this list is increasing. Breeds such as the Dalmatian, Bull Terrier, English Setter and Australian Cattle Dog have a relatively high prevalence, and screening for deafness is also taking place in Border Collies, Tibetan Terriers and Soft Coated Wheaten Terriers. Congenital deafness is usually inherited, although the mechanism for this is not yet known. However, it is advisable to exclude affected individuals from breeding programmes, as this has been shown to reduce the incidence of affected offspring.

How can you test a dog's hearing?

Bilateral deafness may sometimes be identified by the skilled observer, as totally deaf animals frequently show very characteristic behaviour patterns. Suspicion that an animal is deaf may be confirmed by observing the animal's response to banging on a saucepan or jingling keys, but this subjective method of testing hearing ability is very open to misinterpretation. Some animals that can hear are unresponsive; others adapt quickly and stop reacting. Deaf animals may respond to other cues (vibration, air current, body smell) which are undetectable to the person conducting the test. A unilaterally deaf dog is very difficult to

identify as it hears perfectly in the non-affected ear, and so usually behaves normally. It is almost impossible to confirm that a dog is unilaterally deaf without performing a more objective test, such as the Brainstem Auditory Evoked Response (BAER) test.

What is the BAER test?

The BAER test is based on the electrical response of the brain to auditory stimuli. When a sound enters the ear, tiny electrical impulses are generated by components of the auditory pathway. The signals can be picked up by recording electrodes positioned on the head and are, in turn, passed into a computer. A series of clicks are passed into the ear through a headphone, producing a repeatable sequence of peaks and troughs which is displayed on a small TV screen. The test offers quick, non-invasive and accurate assessment of an individual's hearing status.

What do the results mean?

Deafness from cochlear damage eliminates all peaks in the BAER waveform, so a straightforward yes-or-no assessment of hearing ability is possible, depending on the trace obtained. If a characteristic trace is acquired from both ears, the animal is classified as having a normal BAER result.

When a normal waveform can be obtained from one ear only, these animals are identified as unilaterally deaf. Many unilaterally deaf dogs will have gone through life unrecognised, because their behaviour is completely normal.