



Arteriviruses in Hedgehogs

Agent

Arteriviruses are known to infect a wide range of mammals, including equids, pigs, possums, non-human primates, and rodents, and are typically considered to be species-specific (i.e. each arterivirus infects only one host species). Some better known examples include equine arteritis virus (EAV) which can lead to severe respiratory disease most commonly in foals, porcine reproductive and respiratory syndrome viruses (PRRSV 1 and 2) that have the potential to cause reproductive failure and respiratory disease in pigs, and wobbly possum disease (WPD) virus, which can cause an often fatal neurological syndrome in possums. Arteriviruses were recently classified into six sub-families (*Crocarterivirinae*, *Equarterivirinae*, *Heroarterivirinae*, *Simarterivirinae*, *Variarterivirinae*, and *Zealarterivirinae*).

A novel arterivirus, hedgehog arterivirus 1 (HhAV-1), belonging to the *Heroarterivirinae* subfamily, has recently been detected in Western European hedgehogs (*Erinaceus europaeus*) associated with a neurological disease outbreak that occurred at a wildlife rehabilitation centre in England in autumn 2019.

Signs of disease

Arterivirus infections can result in a range of outcomes, from persistent and asymptomatic infections to disease, depending on the virus and the host involved.

HhAV-1 was recently detected in hedgehogs during a neurological disease outbreak with a high mortality rate that occurred at a wildlife rehabilitation centre in England. Both juvenile and adult hedgehogs were affected and showed signs of general ill health, such as inappetence, followed by neurological signs (e.g. tremors, twitching, falling to one side, or seizures) which, in severe cases, progressed to fatal encephalitis. HhAV-1 was detected in multiple organs including the brain from three hedgehogs examined from this disease outbreak. Since investigations found no evidence of other disease-causing agents and the arterivirus was detected in high concentration (i.e. viral load), it is considered a potential cause of the outbreak. However, further research is required to confirm the significance of this arterivirus for hedgehog health. Studies are required to investigate the presence of arteriviruses in free-living hedgehogs in Great Britain and whether asymptomatic infection can occur.

Disease transmission

Arteriviruses can be transmitted through respiratory, venereal and transplacental routes, and via direct contact. The route of HhAV-1 transmission is currently unknown but contact with body fluids (e.g. saliva, urine, or blood) of infected hedgehogs seems likely. Further, whilst arteriviruses are known to be highly species specific, the potential for

transmission of arteriviruses from other animals (e.g. rabbits or rodents) to hedgehogs, or vice versa, needs further investigation.

Distribution

To date, HhAV-1 has only been confirmed in samples from hedgehogs from a wildlife rehabilitation centre in England. Further investigation is required to gain an understanding of the presence of this or similar arteriviruses within free-living hedgehog populations in the UK or other European countries.

Risk to human health

To date, there is no known threat to public health from the arterivirus detected in hedgehogs in Great Britain.

Risk to domestic animal health

The arteriviruses detected in domestic animals to date are only distantly related to the arterivirus found in hedgehogs (i.e. HhAV-1). Whilst arteriviruses are typically considered to be highly species specific, the potential for transmission of HhAV-1 between hedgehogs and other animals (e.g. rabbits or rodents) is yet unknown.

Diagnosis

Diagnosing an arterivirus infection in hedgehogs requires specialist laboratory testing. To date, arteriviruses have only been confirmed in hedgehogs examined post mortem, using molecular tests (i.e. polymerase chain reaction).

Non-specific neurological signs (e.g. tremor, wobbling gait) are commonly observed in sick hedgehogs that are presented as wildlife casualties, and these can result from a number of potential causes. In order to diagnose arterivirus infection, and to exclude other potential causes of neurological disease, thorough pathological investigation is required.

If you wish to report finding a dead hedgehog, or signs of illness in a hedgehog, please visit www.gardenwildlifehealth.org. Alternatively, if you have further queries or have no internet access, please call the **Garden Wildlife Health** vets on **0207 449 6685**.

Control

Whilst supportive treatment for domestic animals affected by arterivirus might be available, effective and targeted dosing of free-living hedgehogs is not possible.

Since arteriviruses are known to cause persistent/asymptomatic infections in other mammal species, and are typically species specific, it is possible that the virus can be carried by persistently infected hedgehogs with no signs of disease. If persistently-infected carriers of the virus do indeed occur, this could explain how HhAV-1 might be introduced into

a wildlife rehabilitation centre. Whether other species (e.g. rodents, rabbits) are susceptible to infection, or may be a source of HhAV-1 infection, is currently unknown. Therefore, strict biosecurity measures and hygiene should be in place as routine in wildlife rehabilitation centres as a preventative measure, also mitigating transmission of other pathogens. Suitable commercial products, such as disinfectants, should be used to clean and disinfect equipment and contaminated surfaces. When disinfectants are used, please follow the manufacturer's instructions.

Due to the recent discovery of HhAV-1, the mode of transmission, as well as the best methods for mitigating the spread of the virus in captive facilities, are unclear at this stage. At the wildlife rehabilitation centre where the hedgehog neurological disease outbreak occurred in autumn 2019, control of the disease within the facility required a combination of stringent hygiene and biosecurity measures, as well as strict controls on juvenile admission procedures.

While reporting sick animals to **Garden Wildlife Health** helps us to build up a picture of hedgehog health across Great Britain, we cannot advise on the treatment of sick animals. If you find a sick hedgehog, you should contact your nearest veterinary surgery or wildlife rehabilitation centre for further advice and use sensible hygiene precautions when handling the animal (see *Prevention* below).

Prevention

Hedgehogs in the wild

Although little is known about the presence of arteriviruses in wild hedgehogs, disinfection of any bowls or plates used to feed wild hedgehogs should be routinely carried out as follows:

- Clean surfaces, bowls or plates using a suitable disinfectant (for example, a weak solution of domestic bleach (5% sodium hypochlorite) or other product following the manufacturer's instructions). Always rinse thoroughly and air-dry before re-use.
- Brushes and cleaning equipment should not be used for other purposes and should not be brought into the house but be kept and used outside and away from food preparation areas.
- Wear rubber gloves and thoroughly wash hands and forearms afterwards with soap and water, especially before eating or drinking.

If you need to handle a hedgehog please use thick gardening or rubber gloves and wash your hands thoroughly with warm water and soap afterwards.

Hedgehogs in rehabilitation centres

Hedgehog rehabilitators should practice good biosecurity as a routine to minimise the likelihood of disease transmission in captivity. It is important to minimise the risk of hedgehogs in care contracting infections from other animals (including e.g. rabbits, rodents as well as other hedgehogs), especially in the light of potential asymptomatic carriers that could then unwittingly be released back into the wild with unknown risks for adverse impacts onto free-living hedgehog populations. Care should be taken when mixing wildlife species in close proximity.

Further information

More advice on hedgehogs in your garden can be found on the Garden Wildlife Health website www.gardenwildlifehealth.org

Scientific publications

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