

Canine Diseases

Rabies

Synonym: Hydrophobia.

Definition:

Rabies is a neurological disease of mammals that is almost invariably fatal once the clinical signs develop. Humans are usually infected when they are bitten by an infected animal, or exposed to its saliva or central nervous system (CNS) tissues. Although rabies is generally well controlled among domesticated animals in developed nations, canine rabies continues to be a serious problem in some areas of Africa, the Middle East, Asia and Latin America.

Etiology

Rabies results from infection by the rabies virus, a neurotropic virus in the genus *Lyssavirus*, family Rhabdoviridae.

Pathogenesis of rabies

Immediately after infection, the rabies virus enters an eclipse phase during which it is not easily detected. During this phase, it replicates in non-nervous tissue such as muscle. After several days or months, the virus enters the peripheral nerves and is transported to the central nervous system by retrograde flow in the axons. After dissemination within the CNS, where clinical signs develop as the neurons are infected, the virus is distributed to highly innervated tissues via the peripheral nerves. Most of the virus is found in nervous tissue, salivary glands, saliva and cerebrospinal fluid (CSF), which should all be handled with extreme caution.

Some virus has also been detected in other tissues and organs, including the lungs, adrenal glands, kidneys, bladder, heart, ovaries, testes, prostate,

pancreas, intestinal tract, cornea, germinal cells of hair follicles in the skin, sebaceous glands, and tongue papillae.

Pathology

GROSS PATHOLOGY

- ☐ There are no pathognomic gross findings.
- ☐ Externally, there may be fresh or healed bite wounds, and sometimes gross trauma due to self-mutilation.
- ☐ In the CNS there may be congestion of meningeal vessels, the brain tissue may appear pinker than usual and there may be mild cerebral oedema.

HISTOPATHOLOGY

- ☐ Histopathological changes do not reflect the severity of the clinical disease.
- ☐ The general CNS findings are those of viral encephalitis, including Perivascular cuffing, vascular congestion, neuronophagia, neuronal degeneration and focal to diffuse gliosis. Lesions may be most severe in the brain stem.
- ☐ The presence of Negri bodies is considered pathognomic for rabies, but these are only seen in about 50 - 75% of cases. These are found most commonly in ganglionic cells of the hippocampus and in Purkinje cells of the cerebellum.
- ☐ Spongiform lesions may be found in the grey matter, in the neuropil and in neuronal cell bodies of the thalamus and cerebral cortex.
- ☐ Spinal and cranial nerve ganglia, particularly the Gasserian ganglia, may show an inflammatory response.

Diagnosis:

The direct fluorescent antibody test (dFA) is the test most frequently used to diagnose rabies. This test requires brain tissue from animals suspected of being rabid and can only be performed post-mortem. All rabies laboratories in the United States perform this test on animals suspected of having rabies. Other tests for diagnosis and research, such as electron microscopy (EM), histologic examination, immunohistochemistry (IHC), RT-PCR, and isolation in cell culture are useful tools for studying the virus structure, histopathology, molecular typing, and virulence of rabies viruses.