

Borna Disease

Borna disease is a sporadic, transmissible, progressive neurologic disease of horses, cats, cattle, and sheep. Natural infections have been reported in other equine, rabbits, and ostriches. Borna disease virus (BDV) has been experimentally transmitted to a very wide range of species, from chickens to nonhuman primates. Evidence in recent years indicates that BDV also infects humans, where it may be associated with various neuropsychiatric disorders, including schizophrenia.

Clinical Signs

Borna disease is a subacute, viral encephalomyelitis, which is a type of brain infection. Historically, the disease has been reported in horses, and occasionally in sheep, in endemic areas in Germany and Switzerland. Through blood testing, evidence of infection has been found in clinically normal horses and other animal species in Israel, Luxembourg, the Netherlands, Poland, Russia, Sweden, the United Kingdom, and the United States.

In cases of natural infection in horses and sheep, the incubation period is usually 2–3 months. This may be reduced to 4–8 weeks in experimentally infected animals challenged by intracerebral inoculation. The characteristic clinical signs of Borna disease are the result of disturbances in motor and sensory functions and changes in behavior. Initially, affected animals may display incoordination (ataxia), yawning, chewing movements, hypersensitivity to stimuli (hyperesthesia), loss of appetite, mild colic, and muscle contractions. The severity of signs progress to severe depression, sawhorse stance, and leaning against objects. Terminal cases exhibit rapid, involuntary eye movement (nystagmus). The duration of clinical illness is normally 1–3 weeks. The case-fatality rate ranges between 60 and 95 percent for horses and greater than 50 percent for sheep. Animals that survive may remain neurologically impaired permanently.

Causal Agent

The cause of Borna disease is an enveloped, negative-strand RNA virus that has yet to be fully characterized. It only affects the nervous system and is only disseminated from the site of infection through the nerves (intra-axonal transport). BDV appears in the brain and cerebral spinal fluid in 3 days in animals infected by the intracerebral or intranasal

route. Less commonly, the virus can be isolated from salivary and mammary glands and the nasal mucous membrane. The virus can be grown in cell culture, in which it produces no detectable cellular changes.

Origination and Development

Based on detailed laboratory examination of nervous tissue from horses affected with Borna disease, evidence suggests that BDV enters the central nervous system (CNS) through nerve endings in the nose and throat area.

The CNS of an animal affected with Borna disease does not develop changes visible to the naked eye. Microscopically, the disease is characterized by an inflammation of nerve cells in the brain. Lesions result from an immune system response to the virus, which can be demonstrated using immunocompromised animals. Rats that are newborn, experimentally immunocompromised, or have had the thymus removed do not develop clinical signs of the disease despite productive BDV replication in the CNS. Such animals do not experience any interference with their vital functions since the disease itself is the result of a virus-induced cell-mediated response by the host.

Epidemiology

It is currently believed that transmission of BDV in cases of natural infection occurs through direct contact with infective nasal secretions and saliva or via contaminated food and water.

The results of recent studies suggest that many cases of BDV infection are clinically inapparent and that the virus is more widespread throughout the world than previously recognized. It is now known that BDV no longer exists only in the traditional endemic regions of Switzerland and Bavaria, Germany. Borna disease should be included in any differential diagnosis for equine neurologic disease. The actual significance of BDV in the cause of schizophrenia and other neuropsychiatric disorders in humans has yet to be determined. Additional studies are required to establish whether Borna disease in horses and other species of animals occurs more commonly than has been reported up to this point.

Additional Information

For more information about Borna disease,
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