

Ectromelia Virus (Mousepox)

Classification

DNA virus, enveloped

Family

Poxviridae

Affected species

Laboratory mice, wild mice, and other wild rodents

Frequency

Rare in laboratory mice, uncommon in wild mice.

Transmission

Ectromelia virus, which causes the disease mousepox, is transmitted by direct contact or by fomites. Although many routes of infection are possible experimentally, exposure to the virus via cutaneous trauma is the natural route of infection. Lesions appear 7-11 days after infection in susceptible strains, and virus is shed for 3 weeks. However, virus has been found in scabs and feces for as long as 16 weeks post-infection. Cage-to-cage transmission in mousepox infections is primarily through handling of infected mice.

Clinical Signs and Lesions

The clinical signs and lesions associated with mousepox depend on the strain of mouse infected. Resistant strains, such as C57BL/6, C57BL/10, and AKR, may show no clinical signs, but serve as a source of virus for the infection of other animals. In contrast, in susceptible strains, such as A, CBA, C3H, BALB/c, and DBA/2, there may be 80-90% mortality. This mortality may occur with no other clinical signs, and animals often die before they shed virus. Susceptible mice exhibit an acute hepatocellular necrosis, as well as necrosis of the spleen, Peyer's patches, thymus, and lymph nodes. Hepatocellular necrosis may be seen as white spots on the liver. Intermediate susceptibility strains may show the following clinical signs: ruffled fur, hunched posture, facial edema, swelling of the limbs, conjunctivitis, cutaneous pustules, ulceration of the muzzle, limbs, ears, and tail, and the lesion that gives

the virus its name, ectromelia, or partial amputation of the limbs and tail.

Diagnosis

Mousepox should be suspected if animals with the above clinical signs are seen in the animal facility, or there is unexplained widespread mortality in susceptible strains. Serologic diagnosis through MFIA™/ELISA or IFA is possible; if animals recover, they produce protective antibodies. Lesions strongly suggestive of mousepox are noted on necropsy, including splenic fibrosis in recovered animals, and liver, spleen, and skin lesions in ill animals. Histologically, intracytoplasmic inclusion bodies are seen in skin lesions. PCR of skin lesions can be used for confirmation. Vaccination with vaccinia virus as part of an experimental protocol may give false positive serology results.

Interference with Research

Overwhelming mortality (near 100%) in susceptible strains may have a negative effect on research programs and animal facilities. Ectromelia virus infection may modify the phagocytic response in resistant strains. In addition, due to the behavior of the virus in resistant strains of mice, tumors, serum, cells, or other biological products taken from infected animals may become contaminated and spread the virus to other mice or facilities.

Prevention and Treatment

Regular testing of colonies for antibodies to ectromelia virus should be part of routine health monitoring. All murine-derived biological products, such as tumors, serum, or cell lines, should be tested for the presence of viral contaminants before being used in mouse facilities or the laboratory. Since animals that recover from the illness develop protective antibodies, quarantine and cessation of breeding may work to eradicate ectromelia in immunocompetent strains, but this is not recommended due to the severity of this infection. Vaccination with attenuated vaccinia virus is possible to preserve valuable strains. In any case, if

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mousepox is suspected, stringent quarantine measures should be instituted immediately. Rederivation through hysterectomy or embryo transfer is the gold standard of disease eradication and should be successful in cases of ectromelia virus infection, especially in animals that have recovered from infection.

If the source of infection is suspected to be a cell line or transplantable tumor, it should be destroyed. However, passage through rats may also serve to remove the virus from cell or tumor lines, since rats are not susceptible to mousepox. The animal house must be thoroughly cleaned and disinfected, preferably with gaseous formalin or vaporized hydrogen peroxide. Ectromelia virus can survive for 11 days at room temperature in blood. All other animal house materials should be discarded as hazardous waste (incinerated) or autoclaved. Autoclaving, formalin treatment, and common disinfectants will inactivate ectromelia virus, as will dessication or detergents.

References

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