

Theiloviruses (MEV [TMEV], RTV [GDVII])

Classification

RNA virus, nonenveloped

Family

Picornaviridae

Affected species

Mice, rats (and experimentally, hamsters and guinea pigs)

Frequency

Common in laboratory colonies, common in wild rats and mice.

Transmission

Murine encephalitis virus (MEV) and rat theilovirus (RTV) are transmitted through the fecal-oral route. In the case of MEV, animals are persistently infected and virus is shed for approximately two months after infection. Little is currently known about RTV, including duration of shedding.

Clinical Signs and Lesions

In most cases, natural infection with theiloviruses is asymptomatic. Some virulent strains of virus can induce a fatal encephalitis after a transitory viremia. Rarely, perhaps one in ten thousand, naturally infected mice show demyelinating lesions of the central nervous system. Experimental inoculation with MEV will result in demyelinating lesions that have been used as a model of poliomyelitis, multiple sclerosis, and demyelinating lesions induced by other viral infections. Animals with demyelinating lesions have flaccid paralysis of one or both hind limbs. Although the agent is relatively common, posterior paralysis in mice is almost always due to other causes, such as lymphomatous infiltration of the spinal cord. No clinical signs or lesions are observed in rats with RTV, with the possible exception of a single report from Brazil.

Diagnosis

Theilovirus infection is usually diagnosed through serology (ELISA, IFA, MFIA™), but PCR is also available.

Interference with Research

MEV has the potential to interfere with research on the nervous system, the immune system, and musculoskeletal system. RTV should be considered similarly to MEV until further data is compiled on its effects on rats.

Prevention and Treatment

If a theilovirus infection is diagnosed, measures should be taken to prevent its transmission via material or contact between animals. Cell lines, transplantable tumors, and other biological products should be tested with PCR or by the MAP test (mouse antibody production) before being inoculated into animals. Wild rodents may serve as a reservoir of infection and controlling their access to the animal house is necessary. Regular serologic testing of resident animals and quarantine of incoming animals is advised. The persistence and stability of theiloviruses in the environment should be a primary consideration in managing a disease outbreak. Chemical decontamination with the help of detergents and oxidizing disinfectants is advised, as well as autoclaving or cold sterilization of materials in direct contact with animals.

Concerning infected animals, appropriate measures will depend on their value and the possibility of replacing them. The theiloviruses are not very infectious, so a test and cull program on the cage level may perhaps eliminate the infection from an immunocompetent colony housed in microisolator caging or ventilated racks. Fostering newborn pups from antibody-positive dams onto clean dams may also be successful. Hysterectomy rederivation and embryo transfer have also proven successful in theiloviral eradication. Transplacental transmission has been described in the literature, but only with experimental infections. In general, total depopulation, thorough cleaning of all aspects of the animal room, and restocking are recommended. The transmission of the virus can be limited by the use of cages with filter covers, by reduction of staff movements, and by strict measures of housing and care. Staff who work in the animal houses must not have rodents as pets.

technical sheet

References

Baker DG. *Natural Pathogens of Laboratory Animals: Their effects on research*. Washington, D.C.: ASM Press; 2003. 385 pp.

Fox JG, Anderson LC, Lowe FM, and Quimby FW, editors. *Laboratory Animal Medicine*. 2nd ed. San Diego: Academic Press; 2002. 1325 pp.

Fox J, Barthold S, Davisson M, Newcomer C, Quimby F, and Smith A, editors. *The Mouse in Biomedical Research: Diseases*. 2nd ed. New York: Academic Press; 2007. 756 pp.

Ohsawa, K., Y. Watanabe, *et al.* 2003. Genetic analysis of a Theiler-like virus isolated from rats. *Comp Med* 53(2): 191-6.

Percy DH, Barthold SW. *Pathology of Laboratory Rodents and Rabbits*. Ames: Iowa State University Press; 2007. 325 pp.