

## Rat Parvoviruses (RPV-1, RPV-2, RMV, RV [KRV], H-1)

### Classification

DNA viruses, nonenveloped

### Family

Parvoviridae

### Affected species

Rats

### Frequency

Common among laboratory and wild rats.

### Transmission

The various parvoviruses are frequently present in laboratory and wild rats due to their persistence in infected animals and their persistence in the environment, including resistance to non-oxidizing disinfectants. Animals shed virus in urine, feces, and oronasal secretions, with the last two routes being common modes of transmission. The parvoviruses' ability to persist in the environment means that exposure to fomites such as contaminated equipment and materials is an important means of transmission. Exposure to wild rats or contaminated rats can be the source of parvoviral infections. Contaminated murine biological products may also be the source of an outbreak. Exposure to contaminated feed and bedding is also a possible route of infection, but has not been verified.

### Clinical Signs and Lesions

There are no clinical signs associated with natural infections of Toolan's H-1 virus (H-1), rat parvovirus 1 (RPV-1), or rat minute virus (RMV). All have a tropism for rapidly dividing cells, especially lymphoid tissue. Rat virus, formerly known as Kilham's rat virus (RV; KRV) may, albeit rarely, produce disease with natural infections in naïve rats. In adult RV infections, scrotal hemorrhage, loss of body fat, and congestion of lymph nodes may all be seen. RV may be transmitted transplacentally, and result in infertility and fetal absorption.

### Diagnosis

Diagnosis of rat parvoviral infection is usually made with

serology, either by MFIA™ / ELISA or by IFA. There are specific assays for the structural antigens (VP) specific to each parvovirus as well as for the non-structural (NS) antigens, which are common to all parvoviridae. Parvovirus infection may also be diagnosed using PCR on tissue or feces. The preferred tissue for testing is mesenteric lymph nodes or spleen, but the PCR may be performed on tissue culture cells or transplantable tumor cells. RV is also readily detected in the lung.

### Interference with Research

Infection with rat parvoviruses may cause rare clinical illness in animals, may affect the immune system, resulting in lower tumor take, alteration of immune responses, and induction of cytokine production, and may induce hepatocellular necrosis in animals exposed to other hepatic insults. Infection with parvoviruses may affect studies involving fetal development. Like mouse parvoviruses, rat parvoviruses, especially H-1, are oncotropic and oncolytic and are being explored as potential anti-cancer agents. Infection of animals with RV during development has the potential to negatively affect a variety of body systems, including the nervous, lymphatic, gastrointestinal, hematopoietic, and reproductive.

### Prevention and Treatment

Parvoviruses often contaminate animal biological products and regular testing of tumors, cell lines, and infectious disease stocks are necessary. Cell lines, transplantable tumors, and other biological products should be tested with PCR or by the rat antibody production (RAP) test before being inoculated into animals. Wild rats may also serve as a reservoir of parvoviral infection and controlling access of wild rodents to the animal house is of paramount importance. Regular serologic testing of resident animals and quarantine of incoming animals is advised.

If a parvoviral infection is diagnosed, measures should be taken to prevent its propagation via material or contacts between animals. Its persistence and stability in the environment should be a primary consideration. Aggressive 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. The infectivity of parvovirus

# technical sheet

is retained after heating for 2 hours at 80°C and for at least 60 days at 40°C. Parvoviruses resist drying, pH from 2 to 11, chloroform, ether, and alcohol.

In regards to infected animals, appropriate measures will depend on their value and the possibility of replacing them. In general, total depopulation, thorough cleaning of all aspects of the animal room, and restocking are recommended. Hysterectomy rederivation and embryo transfer are proven successful in parvoviral eradication, and should be pursued whenever possible. Because of the potential for transmission across the placenta or in semen, rederived offspring should be strictly quarantined until demonstrated free of the virus. 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. Parvoviruses can survive in dust and debris found in ventilation systems and these should not be overlooked in cleaning animal housing and experimental areas. Staff who work in the animal houses must not have rodents as pets.

## References

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