MOUSE HEPATITIS VIRUS

CLASSIFICATION

Family: Coronaviridae
Genus: Coronavirus

- Enveloped, RNA virus
- Linear, single-stranded, positive-sense
- 27-32 kbp genome
- 80-160 nm in diameter (average 100 nm)
- Replicates in cytoplasm

PREVALENCE

Very common. Second most common agent detected by serology in Australian mouse colonies. Does not infect rats.

DIAGNOSIS

ELISA, IFA, RT-PCR, Histological Examination (clinically ill animals)

DISEASE/CLINICAL SIGNS

Dependant on strain.
Adult infections are usually asymptomatic.
May be enzootic (subclinical) or epizootic (clinical) in immunocompetent mice.
Clinical signs most evident in infant mice and typically include diarrhoea, poor growth and death.
Immunodeficient mice (such as athymic *nu/nu* or SCID mice) develop a wasting syndrome characterised by generalised disease and eventual death.

STRAINS

Approximately 25 strains have been identified and can be classified loosely into enterotropic and respiratory strains. Enterotropic strains initially replicate in the intestinal epithelium, disseminate locally to the liver and are usually excreted in high titre in faeces, making this strain extremely contagious. Pulmonary involvement is uncommon. Respiratory strains establish in the nasal mucosa and tend to disseminate to the liver, brain, lymph nodes and hematogenously throughout the body. These strains usually require direct contact as nasal virus titres are lower than enterotropic strains.

TRANSMISSION

MHV is extremely contagious and is transmitted via several routes including:

- Direct contact
- Aerosol
- Fomites
- Bedding
- Airborne particles of faeces
- Transplantable tumours (experimental)
- Cell lines (experimental)

INTERFERENCE WITH RESEARCH

More complications arise from MHV infection in research animals than for any other agent. These include but are not limited to:

- Necrotic changes in organs such as liver, lungs, spleen, intestine, brain
- Differentiation of cells bearing T-Lymphocyte markers
- Enhanced phagocytic activity of macrophages
- Impaired liver function
- Thymic involution
- Decreases in lymphocytic proliferative responses
- Altered hepatic enzyme activity
- Nerve demyelination

DURABILITY

Resistant to:

- Repeated freeze/thawing
- Heating to 56^{o}C (30 minutes)
- Acidic pH

Sensitive to:

- Lipid solvents
- Drying and disinfectants (especially those with detergent activity)

CONTROL

Maintain regular health monitoring of supplier sub-populations and strict protocols for barrier colonies. Immunocompetent mice usually shed virus for 2-3 weeks, so infection can be eliminated by not introducing new susceptible mice for several weeks (stop breeding or purchasing). It should be noted that transgenic and knockout mice often have altered immune systems, which may result in the mice sustaining the disease for longer periods of time. Extreme care should be taken to test transplantable tumour and cell lines before use. No carrier state exists in immunocompetent mice. Vertical transmission has been demonstrated experimentally, but is unlikely to occur under natural conditions in immunocompetent mice.

POST INFECTION

The most effective way to eliminate MHV is to cull all infected animals and obtain clean replacement stock. However, this is not always feasible. Caesarean rederivation and embryo transfer techniques may be used to produce offspring that have not been exposed to MHV. It should be noted that immunocompetent mice recovered from MHV infection resist re-infection, but resistance is strain-specific.

BIBLIOGRAPHY

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