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Mouse Kidney Parvovirus (MKVP) (Murine Chapparvovirus - wild mice)

Prevalence

- A novel mouse parvovirus pathogen, reported in North American and Australian animal facilities
- >15% in North American research colonies
- Persisting in multiple colonies for >10 years

Significance

- Adverse effect of MKPV on renal function can result in increased morbidity and mortality and may compromise research results
- MKPV-induced nephropathy holds promise as disease model enabling better understanding of fibrotic processes and pathogenesis of Chronic Kidney Disease (CKD)

Disease

- Immunodeficient mice (e.g. Rag KO and NSG):
    - Kidney anatomical and functional abnormalities:
        - Macroscopic findings - firm, pale and shrunken kidneys
        - Histology - intranuclear viral inclusion bodies in renal tubular epithelium (RTE), RTE degeneration and necrosis, and interstitial fibrosis
        - Elevated serum creatinine
        - Elevated blood urea nitrogen
    - Progression to renal failure:
        - Weight loss
        - Anaemia
- Immunocompetent mice and nude mice (lack T cells):
    - Minimal clinical illness
    - Mild/moderate nephropathy
- Drives a loss in renal epithelial cells, expansion of activated macrophages, and development of myofibroblasts within kidney

Transmission

- Co-housing or dirty bedding transfer
- Via faecal-oral or urinary-oral routes (highly infectious) likely by time of weaning (3-4 weeks) when virus is highly penetrant
- Dissemination to and/or persistence within the kidney controlled by adaptive immune system

Diagnosis

- PCR based assay (urine, faeces, serum or kidney tissue)

Strains

- Immunocompetent and immunodeficient strains can be infected
- CKD in immunodeficient animals, particularly NSG and Rag mice

Duration

- Experience kidney dysfunction for 4-5 months prior to death

Durability

- Once established, not readily removed from host facilities - detection in a single mouse likely implies infection across colony

Screening

- Clinically silent viruses in immunocompetent mice can have immunomodulatory effects and influence experimental outcomes - routine health monitoring is therefore warranted

Prevention and Control

- Restock facility with MKPV-free mice
- Rederivation - care should be taken to assess status before restarting a colony (murine parvovirus has been seen to adhere to embryos after wash steps)
- Strict bio-exclusion practices and procedures to prevent entry or spread of viral contaminants

Reading

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