

Lymphocytic choriomeningitis virus (LCMV)

Family: Arenaviridae

Prevalence

- Rare in laboratory mice, rats, and hamsters
 - Guinea pigs and rabbits are also susceptible
- Wild mice are considered to be the principle host reservoir
 - Found in pet mice and hamsters

Significance

- High
- Zoonotic potential:
 - Can result in complications such as meningitis, orchitis, arthritis and alopecia
- Arenavirus {RNA} AQIS testing of imported rodents is mandatory for this virus
- Known contaminant of transplantable tumours and rodent cell lines
- Can interfere significantly with in vitro and in vivo experimental results
- Wide range allows readily infect cell lines and transplantable tumours
- Disease outbreaks in laboratory staff and animal handlers have been attributed to rats

Disease

- LCMV is zoonotic and dependant on a combination of viral and host factors
- Early infection of LCMV causes induction or natural killer cell activity
- Usually sub-clinical:
 - May be some runting in infant mice
- Late onset disease may become apparent at 7 -10 months of age, renal disease with lesions associated with immune complex deposition
- Experimental disease induction has been achieved by inoculation of the virus
 - i.e., i.p., s.c., or i.v. This may result in viremia with either death within a few days or weeks or recovery with elimination of the virus
- Human infection may result in "flu-like" disease, aseptic meningitis, influenza, mononucleosis, or less frequently, encephalitis and myelitis
- Natural LCMC infection depends on the age of the mice when infected
- Persistent tolerant infection:
 - Infection developed in utero or within a few days after birth
 - Lifelong viremia and shedding
- Nontolerant (acute) infection:
 - After first week of life (after immunocompetence) viremia occurs
 - No shedding – outcome death (withing few days) or recovery

Transmission

- Direct contact with saliva, nasal and urine - excreted in faeces and urine
- Fomites and aerosols are important in transmission
- Experimental transmission by mosquitoes, ticks and lice has been demonstrated
- Vertical transmission by intrauterine infection

Isolation and Diagnosis

- Preferred - ELISA testing of serum or DBS samples used to screen colonies:
 - Confirmation with fluorescent immunoassay (IFA)
- RT-PCR for prenatal and postnatal detection of LCMV infection
- Tissue culture isolation

Strains

- Many strains have been documented and used in experimental situations
- Strains mostly used for experimental research:
 - WE, E-350, AND CA 1371

Screening

- As per AQIS guidelines for imported rodents:
 - Bi-annually/annually as part of a normal monitoring program
- Regular health monitoring of mouse colony

Duration

Persistent, if animals are infected in utero they will become lifelong carriers.

Durability

- LCMV is sensitive to lipid solvents, disinfectants, and detergents such as formaldehyde
- pH values below 5.5 and above 8.5 result in the loss of infectivity
- Since it is an enveloped virus, LCMV only lives on a surface for a few days

Prevention and Control

- Pathogen exclusion:
 - Regular health monitoring of supplier sub-populations
 - Transport in filter boxes, quarantine at receiving institution with serology testing 2 weeks post arrival
 - Maintenance under strict barrier protocol
 - Pre-screening of biologicals and transplantable tumours prior to introduction to the facility
- Post infection:
 - Destruction and incineration of entire stock affected
 - Cages and other equipment should be autoclaved
 - Formalin fumigation of affected areas with at least a 7day vacancy period. NB

- Caesarean rederivation is not an option with this organism

Reading

- 1991. Infectious Diseases Of Mice And Rats. Washington, D.C.: National Academy Press.
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