charles river
accelerating drug development. exactly.

Lactate Dehydrogenase Elevating Virus
(LDV, LDHV)

Classification

RNA virus, enveloped

Family

Arteriviridae

Affected species

Mice

Frequency

Low in laboratory mice, common in wild mice.

Transmission

Primarily transmitted in the laboratory setting through infected tumors, cell lines, and other mouse-derived biologic materials. Natural transmission usually occurs through bite wounds or sexual contact. This virus may also be transmitted transplacentally or via the milk. These latter two routes of infection are only clinically important if the infected animal is in the first week of infection, when viral shedding may occur via those routes. Animals remain persistently viremic after infection.

Clinical Signs and Lesions

The main clinical sign is the elevation of serum levels of an enzyme produced by the liver (and also by the heart and red blood cells), lactate dehydrogenase. In some susceptible strains (AKR and C58), infected animals may present with a paralytic syndrome if immunosuppressed by age, chemicals, or immune system dysfunction. This syndrome is a result of the LDV interaction with ecotropic murine leukaemia virus present in those strains of mice.

Diagnosis

Diagnosis with serology is not recommended. Due to the presence of antigen-antibody complexes in infected mice, serology will give false-negative results. PCR is a valuable diagnostic tool in the case of LDV infection, as is the measurement of serum lactate dehydrogenase levels. In SPF animals, these levels are elevated within 24 hours of infection with the virus, reaching 8-11 times normal within 72-96 hours of infection, and remain elevated for the life of the infected animal. Thus, serum LDH assays are a good screening tool, but due to false-positives (the LDH becoming elevated for other reasons, such as liver disease, heart disease, or hemolysis of red blood cells), PCR should be used for confirmation.

Interference with Research

Infection of mice with LDV may result in the significant alteration of the function of a number of body systems without clinical signs. The organism replicates in a subset of the macrophage population, and a number of immunological research effects may be noted, including, but not limited to: depression of cellular immunity, increase in cytokine activity, altered humoral immunity, effects on tumor growth, altered immunity to copathogens, hypergammaglobulinemia, and autoantibody development. In addition, in some strains, glomerulonephritis and/or central nervous system disease develops as well.

Prevention and Treatment

Since this virus is primarily transmitted in the laboratory through tumor stocks, cell lines, and mouse-derived biological materials, these items should be tested via mouse antibody production tests or PCR before they are introduced into animals. LDV can be eliminated from tumor stocks by passage through nude rats. Since the virus persists in infected mice, the usual recommendation is elimination of the infected colony. However, embryo transfer or even hysterectomy rederivation may be attempted in cases of long-standing infection, since the risk of vertical transmission is highest during the first week of infection or if animals are pregnant during initial infection. If elimination of infection is attempted via hysterectomy rederivation or embryo transfer, rederived animals should be tested via PCR to ensure that no transmission has occurred.

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