PATHOGENESIS OF EQUINE HERPESVIRUS-1 INFECTION IN THE MOUSE IN REFERENCE TO ANALYSIS OF VIRAL DISTRIBUTION

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The viral distribution in mice experimentally infected with equine herpesvirus-1 (EHV-1) was investigated using the polymerase chain reaction (PCR) and immunohistochemical techniques.

EHV-1 (HH1 strain) was inoculated intranasally into 42 female 3-week-old BALB/cA mice. During the period from 2 to 180 days after the viral inoculation, 4 mice each were sacrificed under deep anesthesia for detection of viral DNA in tissues and organs, and 2 mice each were examined histologically.

All the infected mice showed clinical signs such as body weight loss, ruffled fur, depression, trembling and dyspnea from 2 to 7 days postinoculation (PI). A total of 14 mice died during this period. The surviving mice rapidly recovered from these signs and became clinically normal at and after day 8 PI. None of the mock-inoculated control mice developed any clinical signs.

Histologically, significant alterations were limited to the lungs of infected mice at 2 and 3 days PI. The lungs showed interstitial pneumonia associated with syncytial formation of bronchiolar epithelial cells. Intranuclear inclusion bodies were found in the bronchiolar epithelial cells, alveolar type II cells, alveolar macrophages, and syncytial cells. By immunohistochemical staining using rabbit anti-EHV-1 serum, the viral antigen was detected only in the lungs and trachea at 2 and 3 days PI.

The distribution of EHV-1 in mice was examined by PCR, which amplified the unique region of the EHV-1 glycoprotein B gene. At 2 and 3 days PI, the viral DNA was detected in various tissues and organs such as the liver, spleen, kidney, heart, lungs, thymus, pulmonary lymph nodes, ovary, uterus, brain and dorsal root ganglia as well as in blood cells. At 9 days PI, the viral DNA was detected in the lungs, brain, lymph nodes, and blood cells. At 90 days and 180 days PI, the viral DNA was detected only in the lungs, brain, and trigeminal ganglia by employing Southern hybridization following PCR. No histological abnormalities or viral antigen was detected in any organ or tissue at 90 days and 180 days PI.

These findings suggest that EHV-1 may cause a systemic infection followed by a rapid clearance of the virus. Moreover, the present study indicated that EHV-1 may establish a non-productive, persistent infection in the lungs, brain, and trigeminal ganglia in the infected mouse.