

Initial replication in the lung and systemic dissemination of ovine herpesvirus 2 in American bison after intranasal nebulization

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Malignant catarrhal fever caused by ovine herpesvirus 2 (OvHV-2) is an important infectious disease in American bison with high mortality rates during natural outbreaks. Sheep are infected subclinically and serve as the reservoir. Experimental infection of sheep by intranasal nebulization with OvHV-2 from sheep nasal secretions showed that a brief period of viral replication in the lungs is concurrent with an increase in transcription of immune response genes and is followed by systemic dissemination of latent virus. This conclusion is supported by the fact that expression of ORF25 (capsid protein), a marker for lytic replication, is detected only in the lungs during early infection. Although virus-host interactions in bison are essentially unknown, recent studies during late preclinical and clinical stages have demonstrated ORF25 transcripts in most bison tissues. In order to compare events early in infection between the reservoir host (sheep) and a clinically susceptible host (bison), 24 bison infected with OvHV-2 were euthanized in pairs at two to three day intervals between 1 and 26 days post-nebulization (DPN). An increase in OvHV-2 genome copy number in lungs began at 7 DPN, peaked at 12 DPN and declined by 14 DPN. Viral DNA was first detected outside the lung at 21 DPN and in 90% of tissues by 33 DPN. ORF25 expression was detected first in lung on 9 and 12 DPN and then in over 80% of tissues by 33 DPN. Unlike in sheep, no increase in immune response gene transcription was associated with viral replication in the lung of bison. We conclude that early viral replication in bison lung is similar to what occurs in sheep but is not associated with a strong local immune response and is followed by dissemination of lytically replicating virus. These data indicate that differences in OvHV-2 infection dynamics and immunity between sheep and bison may be more complicated than a simple inability of the bison immune response to control virus. Further work is required to elucidate details of viral replication, dissemination and pathogenesis. Ultimately, a better understanding of the virus and the host immune response will inform development of a vaccination strategy.