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INTERACTION OF EPIZOOTIC HEMORRHAGIC DISEASE VIRUS WITH BOVINE ERYTHROCYTES IN VITRO: ELECTRON MICROSCOPE STUDY

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The interaction of epizootic hemorrhagic disease virus (EHDV) with bovine erythrocytes in vitro has been studied, and the results are presented herein. EHDV, a member of the Orbivirus genus in the family Reoviridae, causes fatal hemorrhagic disease in North American white-tailed deer (Odocoileus virginianus). Other captive and free ranging ruminants may also be infected with the disease [1, 4]. At least 10 serotypes of EHDV are recognised worldwide, but serotypes 1 and 2 are enzootic in the United States. In white-tailed deer, viremia is short and the disease usually follows a peracute course leading to death. In cattle, EHDV infection is common but typically asymptomatic, and viremia in EHDV infected cattle is usually short. However, infection of European breed of cattle with laboratory adapted strain of EHDV induced viremia which persisted for up to 50 days [3], suggesting that cattle may play a role in the epidemiology of the disease [2]. During the later course of EHDV-infection, the virus is principally associated with erythrocytes. Erythrocyte-associated viremia has been reported with a number of orbiviruses including bluetongue virus (BTV); however, there is no information available on the interaction of EHDV with bovine erythrocytes. The mechanism involved in prolonged viremia in EHDV-infected cattle, despite the presence of circulating neutralising antibodies, has yet to be explained. A plaque-purified EHDV serotype 1 (New Jersey strain) was used to inoculate suspended bovine erythrocytes, obtained from 4-month-old calves, at a multiplicity of infection (MOI) of 1, and the inoculated erythrocytes were incubated at 37°C for 1 h. Uninoculated erythrocytes were used as controls. The details for collection of blood, preparation of erythrocytes, preparation of sections for transmission electron microscope were described previously [5].

EHDV particles were commonly observed in close association with erythrocyte cell membrane and were typically present in invaginations (Fig. 1). The viral particles measure about 50–70 nm in diameter and were recognized as EHDV particles by their morphological appearance. The viral particles were not observed in the erythrocytes from controls. The results of this study indicated that EHDV becomes associated with the erythrocytic cell membrane soon after in vitro infection of bovine erythrocytes, with the virus particles becoming sequestered in invaginations of the cell membrane. The infection of erythrocytes did not progress beyond the cell membrane invagination, as free virions
were not seen in the cytosol, thus no evidence of viral replication was identified within the erythrocytes.

In conclusion, this preliminary investigation suggests that association of EHDV with bovine erythrocytes is responsible for prolonged viremia.

REFERENCES

