NATURE OF HOG CHOLERA VIRAL STRAINS ISOLATED FROM FIELD OUTBREAKS

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We have previously reported that hog cholera (HC) viral strains were divided into 2 groups on the basis of the difference in the degree of neutralization by antibody against bovine viral diarrhea (BVD) virus, and those serological properties have been shown to be correlated with their pathogenicity (Kamijo et al., 1977). One group of the strains wasslightly neutralized (subgroup H) and the other group was readily neutralized (subgroup B) by the BDV antibody. Most of the strains of the subgroup H were virulent and produced an acute HC in inoculated pigs. On the other hand, pathogenicity of the strains of the subgroup B were low.
In this report, a total 33 HC viral strains isolated from the field outbreaks in the past 16 years were tested for their antigenicity and pathogenicity. Furthermore, responses of pigs chronically infected with HC virus were investigated.

MATERIALS AND METHODS

Antigenicity: All strains were tested for the degree of neutralization by both antisera against the strain T20-5 of BVD virus and the ALD strain of virulent HC virus. Antisera used were prepared from goats by inoculation with respective viruses, and END (exaltation of Newcastle disease virus) neutralization test was applied in the experiments by using primary swine testicle cell cultures (Shimizu et al., 1964).
Pathogenicity: Pathogenicity of 10 respective strains of the field isolates was examined by the pig inoculation experiments. Two to 15 pigs were inoculated subcutaneously with 2ml of $10^{5.0}$ $TCID_{50}$/ml of each strains for this purpose. Pigs were observed daily for the occurrence of thermal responses and clinical signs. Blood samples were periodically collected and tested for leukopenia, viral contents and antibody responses. Some pigs were examined for viral contents in tissues, histopathology and immunohistopathology.

RESULTS

Antigenicity: HC viral strains tested were divided into 4 groups on the basis of the difference in the degree of neutralization by the BVD and virulent HC virus antibodies. Ten of 33 strains were poorly neutralized by the BVD antibody, but well by the antibody to virulent HC virus. They were considered as the members of the subgroup H. Twenty one strains were readily neutralized by the BVD antibody, and classified as the members of the subgroup B. One strain showed property of intermediate type of the subgroups H and B, and the other strain belonged to neither subgroup H nor B.
Pathogenicity: Pathogenicity was higher in the strains of the subgroup H than in those of the subgroup B. All strains of the subgroup H produced an acute and typical HC in inoculated pigs, and they died within 14 days after infection. Duration of the disease in pigs inoculated with 5 different strains of the subgroup H was 7.5, 8.5, 10, 10 and 12 days on average, respectively. On the other hand, the strains of the subgroup B induced subacute or chronic HC in inoculated pigs. Pigs inoculated with 4 different strains of the subgroup B died between 16-17, 14-22, 17-30 and 17-25 days after infection, respectively.
The Kanagawa strain, which is one of representative strain of the subgroup B, produced various forms of HC in inoculated pigs. Three of 15 pigs inoculated developed subacute HC and died 2-3 weeks after infection. Ten pigs developed chronic HC and died 4-14 weeks after infection. One pig showed chronic HC, but completely recovered with producing high HC neutralizing antibody. The other pig showed no clinical signs of HC, but HC antibody was detected in serum 3 weeks after infection. Probably, subclinical infection might occurr in this pigs.

Responses of pigs with chronic HC: Most of pigs inoculated with the Kanagawa strain developed chronic HC. They showed thermal responses until death occurred. Virus could be detected in serum throughout the course of the disease. Pigs with chronic HC produced serum neutralizing antibody, and virus and antibody were detected simultaneously from serum. Virus could be isolated not from undiluted but from diluted serum. This seems to be due to the coexistence of antibody with virus in serum. In fact, this phenomenon was reproduced when the appropriate amounts of virus and antibody were mixed in a tube. Viral infectivity in serum was reduced when anti-porcine IgG antibody was allowed to absorb the serum. These suggest that virus-antibody complex might be present in the serum of chronically infected pigs.
When frozen sections of kidney obtained from chronically infected pigs were stained with anti-porcine IgG fluorescent antibody, deposition of immunoglobulin in the renal glomeruli was evident. Antibody eluted from the renal glomeruli by treatment with low pH revealed neutralization to HC virus. No antibody could be recovered from the kidney of pigs inoculated with a vaccinal strain of HC virus, although they produced high serum neutralizing antibody.

CONCLUSIONS

This study confirmed our previous report (Kamijo et al. 1977) that HC viral strains can be classified into 2 groups (subgroups H and B) on the basis of the degree of neutralization by the BVD antibody, and that those antigenical differences might be correlated with their pathogenicity.
In addition to the subgroups H and B, other 2 types of HC viral strains, intermadiate and non-classified types, were recognized in this study. These indicate that various HC viral strains with different antigenicity and pathogenicity exist in the field. Furthermore, pigs inoculated with the Kanagawa strain manifested various forms of infection. This suggests that the course of the disease in pigs infected with a particular strain of HC virus is influenced by unknown factors of the host side. It is supposed, therefore, that clinical forms of HC in the field might vary widely.
Finally, possible role of immune-complex in pathogenesis of chronic HC was suggested.

SELECTED REFERENCES

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