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Different pathogenicity of megalocytivirus, turbot iridovirus, in marine fish species

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Introduction

Megalocytiviruses have been caused mass mortalities in various fish species in many Asian countries. Until now, the infection cycle of these viruses among fish species has not been elucidated. In order to suppress the disease and reduce the spread of viruses in aquaculture, it needs to understand how these viruses transmit from host to host. In this study, we experimentally infected several economically important Korean cultured fish species, including turbot, flounder and rock bream, with a megalocytivirus, turbot iridovirus (TBIV), to evaluate the susceptibility of these fish to the virus.

Materials and Methods

The source of the original inoculum was spleen and kidney tissue removed from diseased turbot that were naturally infected with the TBIV.

Turbot (body weight 4.4-5.8 g), flounder (9.5-11.4 g and 75.2-96.3 g) and rock bream (2.6-3.2 g and 3.2-3.7 g) were obtained from culture farms at Go-chang, Wan-do, Nam-hae and Yeosu in the southern part of Korea.

Fish received an intraperitoneal injection of 100 $\mu\ell$ of the inoculums, while the control groups were injected with 100 $\mu\ell$ of HBSS. Of these experimental infections, turbot were inoculated with either primary inoculums or 10- or 100-fold diluted inoculums. Experimental trials were performed under various water temperature conditions (17, 20, 22 and 25℃) to determine the effect of water temperature on the virus infection. TBIV detection by PCR was performed using tested fish after experimental infections.

Results and discussion

The pathogenicity of TBIV was observed in turbot although no mortality was recorded in the remaining two fish species. The morality rate of primary inoculums injected-turbot reared at 22℃ was 60%. Additionally, a 100% morality was recorded for virus-infected turbot reared at 25℃, even when the fish were inoculated with a 100-fold dilution of the primary inoculums. We speculated that the 100% mortality must be caused by a combination of immune suppression by high temperature stressor and TBIV infection because turbot is generally reared bellow 20℃. As the cause of different pathogenicity of TBIV among the three fish species, we hypothesize two possibilities as follows. One possibility is that the susceptibility of rock bream and flounder to TBIV is low although rock bream showed high susceptibility to RSIV, suggesting that TBIV may be virologically different from RSIV. Another possibility is that different immune levels among the three fish species may cause the different pathogenicity of TBIV, i.e., stressors such as temperature might alter the immune levels of the three fish species, resulting in changes of the TBIV pathogenicity. The PCR detection rate for TBIV was 100% in the virus-injected turbot maintained at 25℃ and 22℃, and 70% and 20% in fish kept at 20℃ and 17℃, respectively. Although no mortality was observed in flounder and rock bream, the virus was detected in both fish species. These PCR data indicated that flounder and rock bream are also susceptible to the virus. This suggests that flounder and rock bream may play an important role as a vector and/or reservoir of the virus during disease occurrence in turbot.

References

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