

Passive immunisation of goldfish with the serum of those surviving a cyprinid herpesvirus 2 infection after high temperature water treatment

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Abstract

Herpesviral haematopoietic necrosis of goldfish caused by cyprinid herpesvirus 2 (CyHV-2) can be controlled by raising water temperature to a virus non-permissive temperature of 34°C. Consequently, the goldfish can survive and acquire resistance to the disease; the underlying mechanism of acquired resistance, however, remains unclear. In this study, we investigated serological changes in the surviving goldfish, with a focus on their humoral immunity, and examined whether sera of the surviving goldfish conferred passive immunity to naïve goldfish. Levels of anti-CyHV-2 antibodies in 8 of the 9 survivors measured via ELISA were higher than those in control fish. Neutralising antibodies were detected in the sera of 2 survivors, but no direct correlation was observed between ELISA optical density value and neutralising antibody titer. Passive immunisation tests showed that recipients injected with the serum containing neutralising antibodies showed higher survival rates than the control group. The sera from 6 other survivors showed no effect on the recipient's mortality regardless of anti-CyHV-2 antibody levels. These results suggest that neutralising antibodies can contribute to acquired immunity in survivors, and other protective factors, including cell-mediated immunity, may work in the survivors that show no detectable neutralising antibodies.

Introduction

Herpesviral haematopoietic necrosis (HVHN), caused by cyprinid herpesvirus 2 (CyHV-2), has led to significant losses to goldfish (*Carassius auratus*) and Prussian carp (*C. gibelio*) farms worldwide (Jung and Miyazaki, 1995; Haenen et al., 2016; Nanjo et al., 2016). The disease manifests with severe necrosis of haematopoietic tissues (Jung and Miyazaki, 1995; Xu et al., 2013).

CyHV-2 infection can be controlled by maintaining the water temperature at 33–35°C for goldfish (Tanaka, 2005; Ito and Maeno, 2014) and 32°C for Prussian carp (Liang et al., 2015). Shibata et al. (2015) reported that temperatures 34°C and above are non-permissive to CyHV-2. The surviving goldfish can acquire resistance to the disease (Tanaka, 2005; Nanjo et al., 2016). Understanding the mechanism underlying this acquired resistance can help elucidate how the goldfish becomes immune to the disease

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