

The Nucleoside Analog FdCyd Suppresses Infectious Hematopoietic Necrosis Virus *in vitro* and *in vivo*

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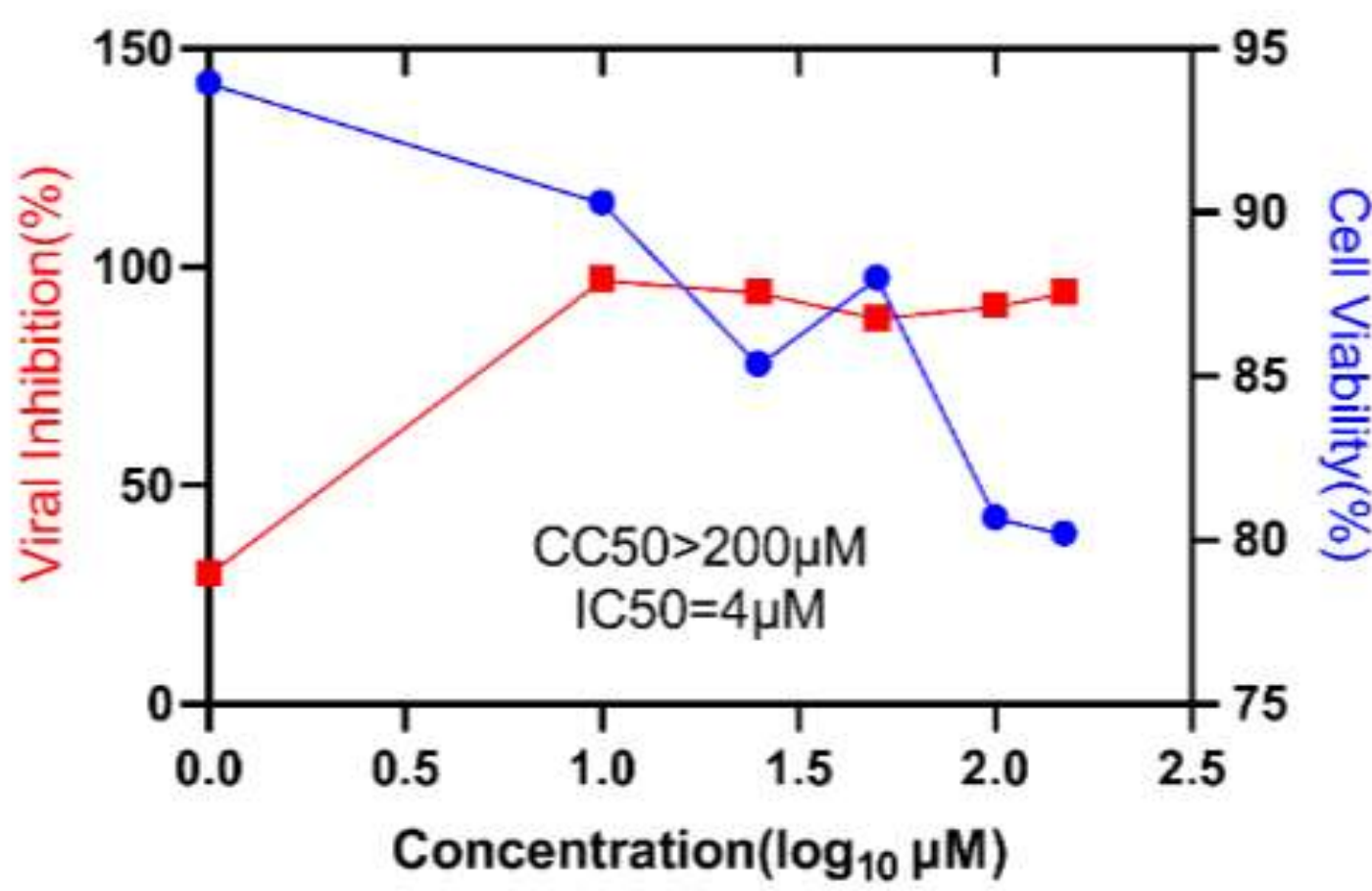
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Abstract

Infectious hematopoietic necrosis virus (IHNV) is a significant pathogen in global salmonid aquaculture, causing infectious hematopoietic necrosis and substantial economic losses. Currently, the only commercially available IHNV vaccine is a DNA-based formulation and permits in only a few countries. There is thus a need for more effective vaccines and antiviral drugs. This study demonstrates that 2'-Deoxy-2'-fluorocytidine (FdCyd) effectively inhibits IHNV infection *in vitro*, with a 50% cytotoxic concentration (CC₅₀) exceeding 200.0 μM and a 50% inhibitory concentration (IC₅₀) of 4.0 μM. FdCyd was found to suppress viral binding, internalization, and replication when co-incubated with the virus, whereas pre-incubation primarily impaired viral replication. The optimal inhibitory concentration *in vitro* was 25.0 μM. *In vivo* experiments further confirmed that FdCyd reduced IHNV infection and significantly improved the survival of rainbow trout compared to a mock-treated group. These results indicate that FdCyd is a promising candidate for the control of IHNV in aquaculture.

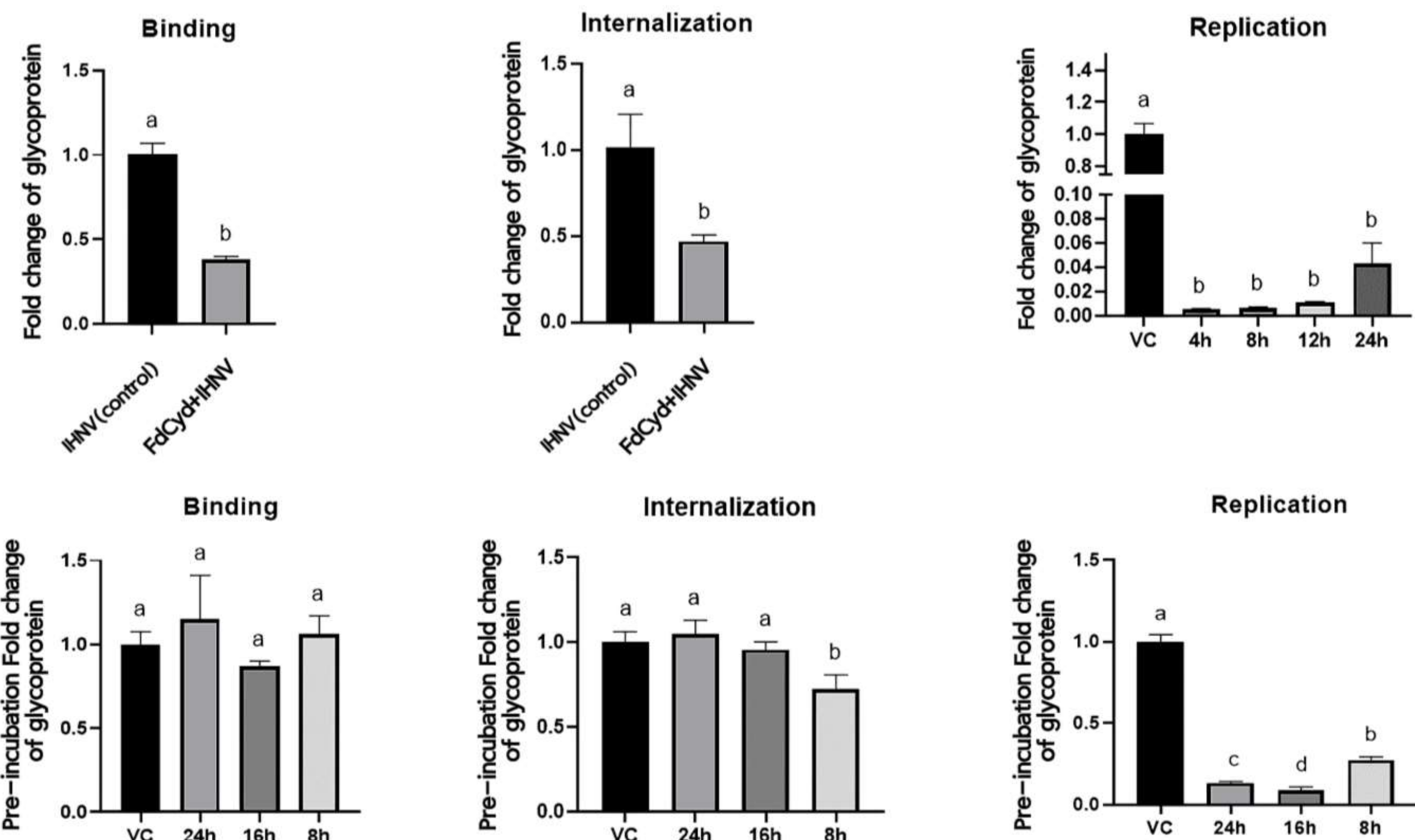
Results

CC₅₀ and IC₅₀ Determination



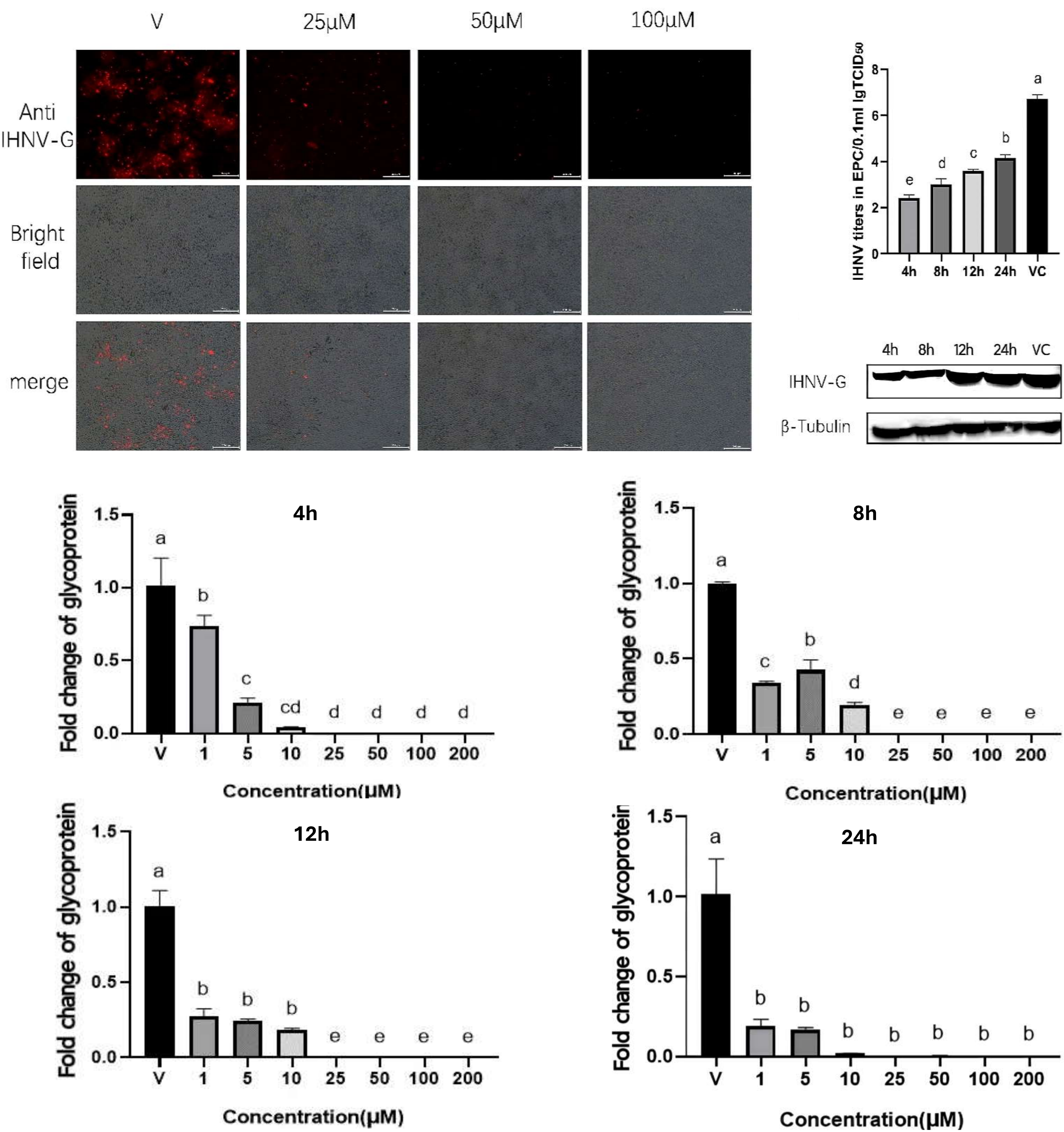
The CC₅₀ of FdCyd was >200.0 μM, and IC₅₀ was 4.0 μM.

Functional Stages of FdCyd



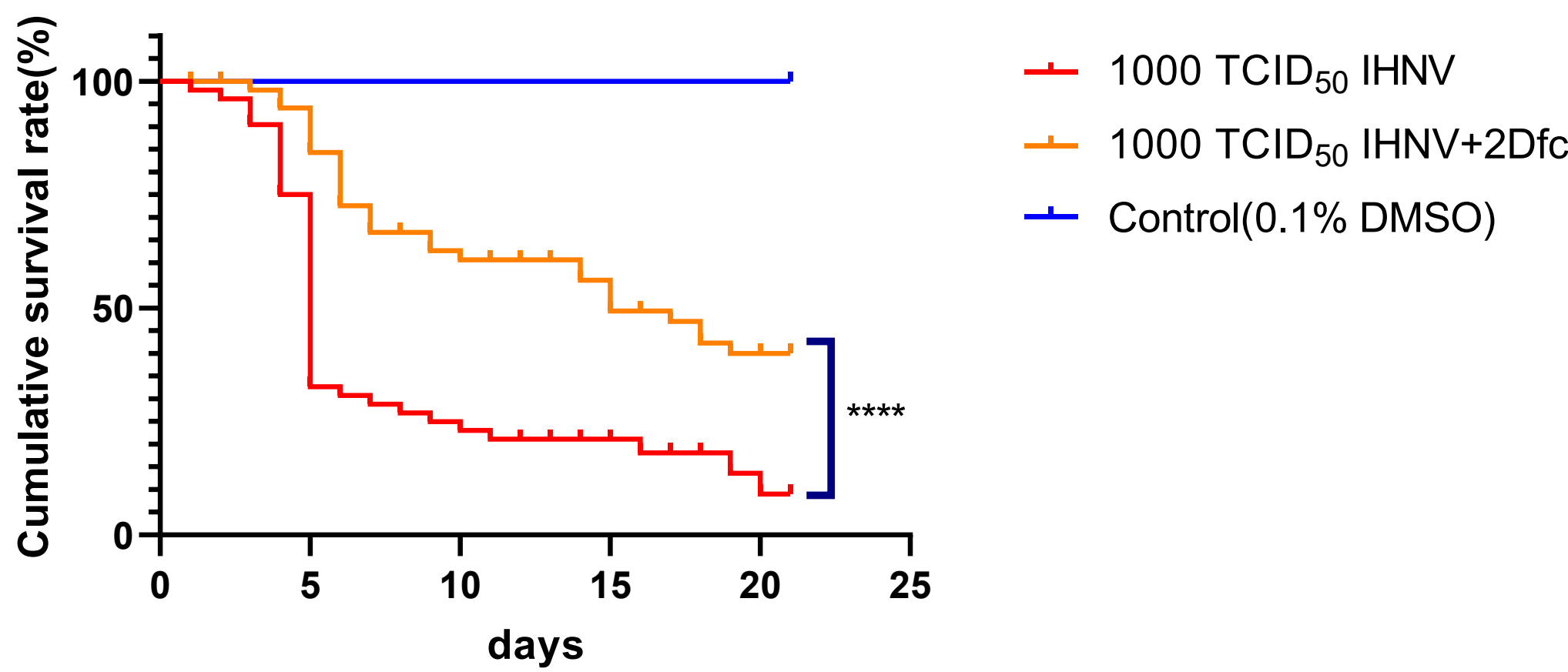
Co-incubation of FdCyd with IHNV demonstrated that FdCyd inhibits viral binding, internalization, and replication.
Pre-incubation of FdCyd significantly inhibited only the viral replication stage.

Determination of Effective Concentration and Treatment Duration



The most effective concentration of FdCyd against IHNV infection was determined to be 25.0 μM *in vitro*.

In Vivo Antiviral Assessment



FdCyd reduced IHNV infection in rainbow trout and significantly improved their survival by 30%.

Conclusion

FdCyd demonstrated potent antiviral activity against IHNV both *in vivo* and *in vitro* models.
FdCyd is a promising candidate for the control of IHNV in juvenile rainbow trout aquaculture.
The antiviral mechanism of FdCyd has yet to be fully elucidated.



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