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Immunochromatography test as anew rapid diagnosis kit for detection of Nervous Necrosis Virus (NNV) in Global Mariculture

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Abstract

The design and establishmentof rapid diagnostic methods arevery urgent since the increasing number of infectious pathogens leading to threatening diseases in aquaculture systems. Rapid, accurate diagnosis of disease and fast removal of infected fish are critical for effective outbreak control. Prompt action in the early stages of any disease problem can have an enormous impact on the scale of the outbreaks. As a result, the design of rapid, accurate and sensitive methods has been considered by researchers to replace with other complex and costly immunoassay methods like Radioimmunoassay and ELISA in recent years. Most of these methods are based on agglutination, immunochromatography (ICG) and some molecular techniques. ICG tests are used for the qualitative and quantitative detection of a wide variety of antigens and antibodies in hospitals, clinics, physician offices, and clinical laboratories. Immunochromatography assay or lateral-flow immunoassay is based on the flow of the infected sample along a cellulose membrane via capillary action. Major advantages found in this technology are inexpensive, simple to use, portable, short assay time (with results in minutes), does not require skilled operators and complicated equipment.
Nervous Necrosis Virus (VNN) is considered one of the most important threats for mariculture and aquaculture in the world. The agent of VNN virus is placed in the family Nodaviridae, genus Betanodavirus. This virus may lead to 100% mortality in larval and juvenile fish and can cause significant losses in older fish. Fish infected by VNN virus exhibits a range of neurological signs; abnormal swimming behavior and tissue vaccuolation in the central nervous system and retina. Up to now the virus has been identified in more than 70 fish species worldwide, mainly marine fish. Few outbreaks have also been recorded in freshwater farms; For instance, A Greek scientist detected a nodavirus from intensively reared freshwater sturgeon, *Acipensergueldestaedi*. They also expressed that nodavirus cause to mortality in larval stages and leads to spinal deformities in older ages. The transmission of the virus can occur both horizontally and vertically. It can persist in the host for a long time sub-clinically and may cause severe mortality under extreme environmental conditions. Therefore, it is very necessary to detect the virus before any clinical signs appear.

In Iran, the disease was first reported in wild golden grey mullet (*Liza auratus*) of the Caspian Sea by author in February 2004, and all VNNV isolates belonged to RGNNV genotype. Since betanodaviruses are completely resistant to environmental conditions; therefore, it is possible to move easily via commercial activities. In addition to, there will be a possibility that viruses introduce horizontally through contaminated rearing water and instruments. Therefore, we decided to design and establish a rapid diagnostic kit in order to detect betanodaviruses and compare its sensitivity and specificity with immunohistochemistry and Reverse transcription polymerase chain reaction (RT-PCR).

Keywords: *Rapid Diagnostic Kit,Nervous Necrosis Virus (NNV), Iran*

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