

Morning to all greetings from India. I am Dr. Sahul Hameed from the WOA Reference Laboratory for White Tail Disease of *Macrobrachium rosenbergii*. I apologize for not being there in person because of some medical emergency.

Freshwater prawn is an important crustacean species to culture. Recently the production of the freshwater prawn has been reduced significantly worldwide due to many factors including **white tail disease (WTD)**. The disease is caused by two viral pathogens, namely **Macrobrachium rosenbergii nodavirus (MrNV)** and **extra small virus (XSV) particles**. These viral pathogens affect the early life stages of the freshwater prawn, specifically the **postlarvae and juveniles**, while adults are resistant. The gross clinical sign of the disease is **opaqueness of the abdominal muscle**, particularly at the tail region. These viral pathogens have **vertical and horizontal transmission**.

Regarding expertise, research has been carried out on various aspects of white tail disease. This includes **pathogenicity** of viral pathogens on different developmental stages of prawn, as well as the **host range and tropism** in infected animals. We also develop **diagnostic tools -PCR, RT-PCR, and immunological-based diagnostic tools**. We also study the **immunomodulatory effect of recombinant viral proteins** to protect prawns from infection. We have at least **23 international publications** exclusively on nodavirus disease and a chapter on nodaviruses in the *Encyclopedia of Virology*. I have been nominated as Chair of the Study Group of Nodaviridae and Sarthroviridae by International Committee on Taxonomy of Viruses.

We are also providing services to supply **positive controls** to **WOAH member countries**, with 20 countries to date. We also give materials to domestic research organisations. We have a good laboratory with facilities and have been accredited **ISO 17025:2017. standards** as mandated by WOA. We have sufficient stock of materials for research and provide materials to WOA Member countries.

Recent innovations, recently we have developed the **lateral flow kit** that can detect the virus within **10 minutes**. This kit is farmer friendly, without sophisticated equipment, so this kit is very useful for field level tests, farmers can detect the disease on the field. We also study immunomodulatory effects of the **major capsid protein**. This protein stimulates the immune system and protect the PLs and juveniles from WTD infection.

Studies have been carried out on **double-stranded RNA (dsRNA)** specific to mRNA accessory and found protection against WTD infection. So they studied the effect of the **encapsulated double RNA virus-like particles** delivered through immersion to control WTD infection in hatcheries. So RNA technology and immersion application would be useful for easy field applications. It also found that the role of **glycans** as binding

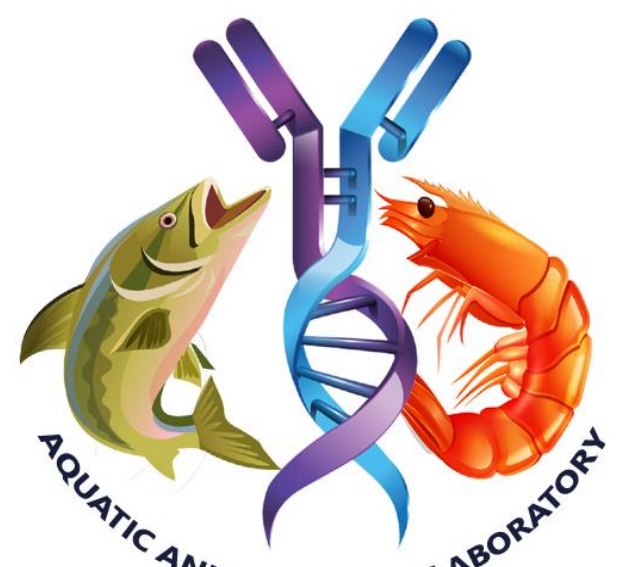
molecules for MrNV attachment in **susceptible gill tissues** that is highly susceptible to the virus. Targeting the molecules in the gill tissue will help develop control strategies for infection.

With regards to help from WOAHA, we need **financial support** from WOAHA or Members through WOAHA to help maintain activities of the reference laboratories. We are currently spending nearly **10,000 USD** every year to maintain the Reference Laboratory. We need help with the **transfer of biological materials**. We are facing difficulties to transfer biological materials after COVID, so we need help from WOAHA to transfer materials to different Member countries.

We have sufficient research materials like viral pathogens, recombinant viral proteins, and antibodies with any interested Member countries. We need **collaborative research** to find factors responsible for resistance against viral pathogens in adults. This will help revive the freshwater culture in large scale prawn growing countries.

We have very capable laboratories to train scientific and non-scientific staff in **cell culture techniques and molecular diagnostics**. We have repository cell lines, we are maintaining **75 lines from variety of fishes**. This will be useful for all WOAHA Member countries. We have the repository for **viral pathogens, stock of wild pathogens of shrimp, prawns, and fish**, so this will be useful for any collaborative research work with any of the interested countries. Thank you.

WOAH Reference Laboratory for White Tail Disease of *Macrobrachium rosenbergii* Aquatic Animal Health Laboratory, C. Abdul Hakeem College



1. Overview

White Tail Disease (WTD) is a serious viral infection affecting post-larvae and juveniles of the giant freshwater prawn (*Macrobrachium rosenbergii*).

- It is caused by two viruses acting together: *Macrobrachium rosenbergii* nodavirus (MrNV) and extra small virus (XSV) and causing 100% mortality within 3 to 5 days..
- The clinical sign is a milky, white, or opaque discoloration of the abdominal (tail) muscles.
- These viral pathogens have vertical and horizontal transmission of infection.
- WTD has been diagnosed by RT-PCR and immunological methods

2. Expertise, services and facilities (photos)

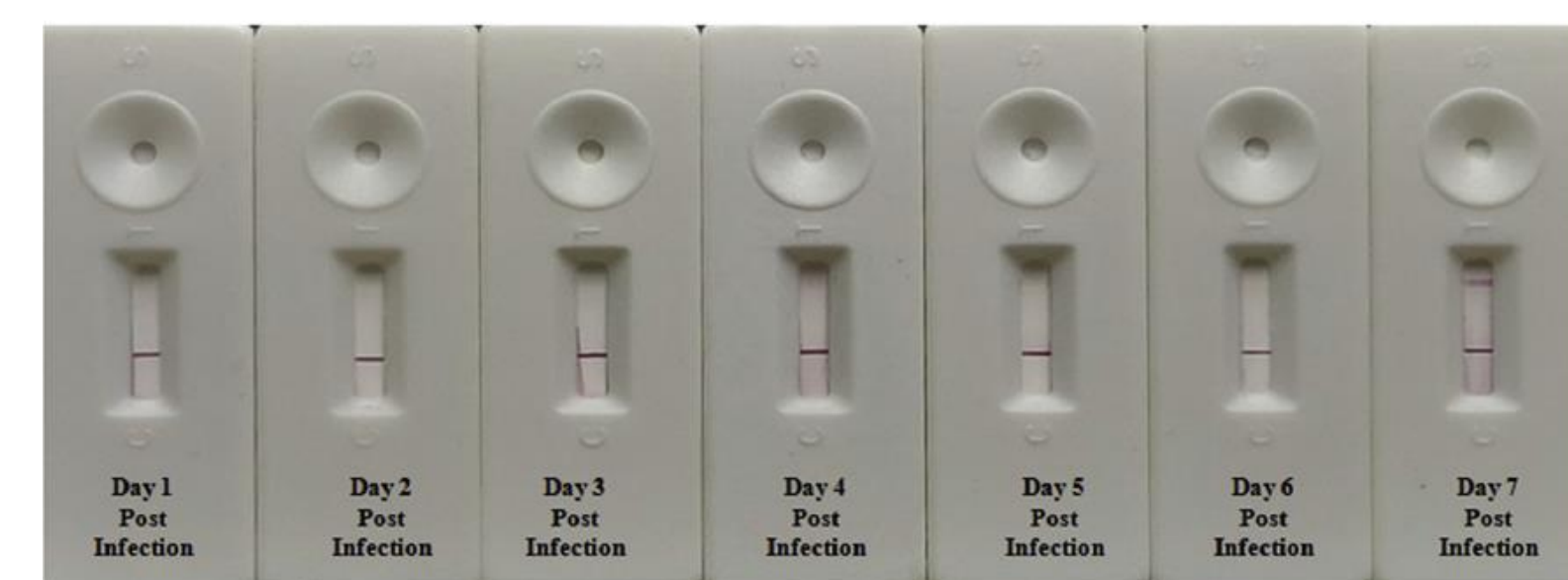
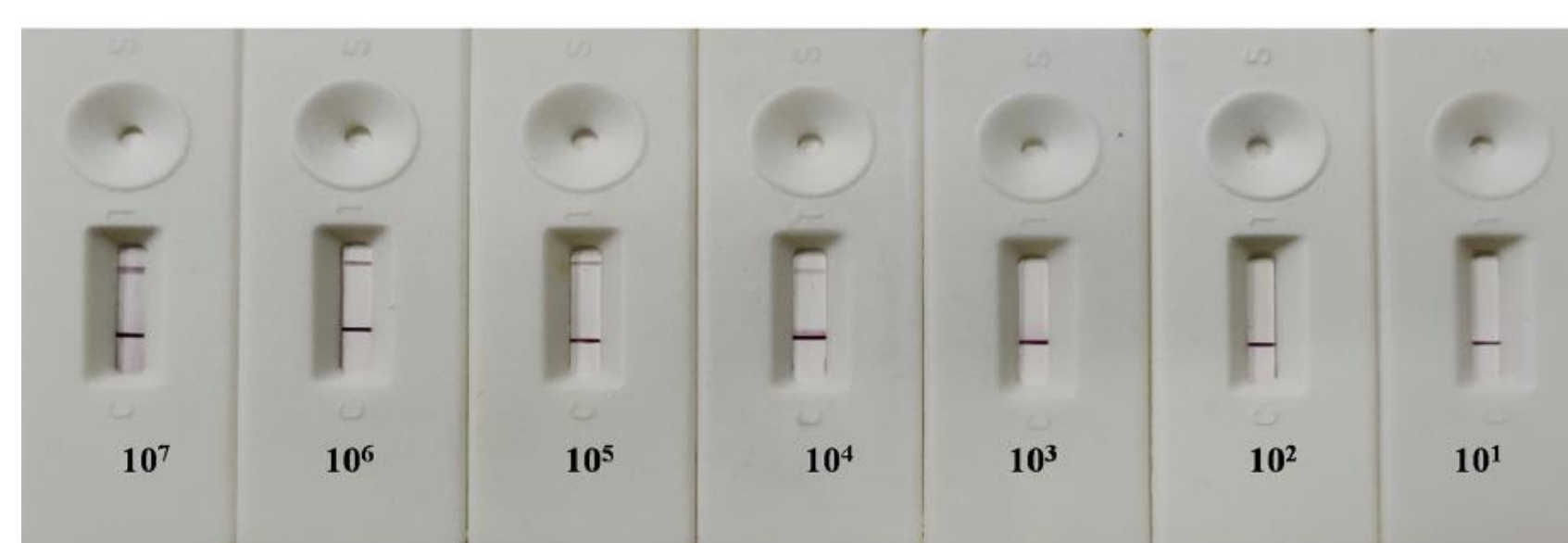
- Published 23 International publications covering various aspects of WTD
- Written a Chapter on *Sarothroviruses for Encyclopaedia of Virology, 4th Edition*
- Nominated as Chair, Study Group of *Nodaviridae* and *Sarothroviridae* by International Committee on Taxonomy of Viruses.
- Providing positive control and reagents to diagnosis of WTD. Supplied positive controls to twenty WOAHA member countries and domestic research organizations.
- Established well-equipped Laboratory exclusively for WTD and accredited by ISO 17025:2017. Having sufficient stock of MrNV/XSV and diagnostic reagents.



3. Recent Innovations, research highlights, technical developments

Recently, different studies have been carried out on diagnostics and control measures for WTD of freshwater prawn.

- An antibody-based *lateral flow immune assay (LFA)* has been developed for the early detection of MrNV in the post-larval stage of *M. rosenbergii*. It is farmer friendly and suitable for field level test (Snehal...Sahul Hameed et al., 2021).



- The recombinant major capsid protein (r-MCP) was found to be an effective immunostimulant to stimulate the immune system of prawn to protect the post-larvae of *M. rosenbergii* from WTD infection (Farook..Sahul Hameed et al., 2014).
- Somrit et al. (2020) found the role of *glycans as binding molecules for MrNV attachment* in susceptible tissues such as the gills and any strategy that target the virus – host surface glycans interactions helps to reduce MrNV infection in prawn.
- Prawns fed with a combination of *dsRNA of MrNV and XSV capsid genes* showed high relative percent survival whereas 100% mortality was observed in prawn fed with control dsRNA coated feed. This study showed that oral administration of dsRNA is effective, feasible and economical to control MrNV infection in the hatcheries and nurseries (Kumar et al., 2013). The dsRNA specific to MrNV-capsid gene was encapsulated into virus like particles (VLP) and delivered to prawn by immersion (Thongsum et al., 2026) to control WTD infection.
- RNAi technology and immersion application should be foreseen as one of the practical, powerful means to fight against prawn viral infection in field application.
- The recent technical development related to WTD include *field level diagnostic kit (LFIA) for early detection of MrNV, recombinant viral capsid protein as immunostimulant and dsRNA to control WTD infection*.

4. How can we support Members?

- *Financial support* either from WOAHA or home country through WOAHA is very much needed to maintain WOAHA Reference Laboratory
- It is difficult to transfer the biological materials to other member countries after COVID period. *So, we need support from WOAHA to transfer the materials among the member countries.*
- We have research materials like viral pathogens, recombinant viral proteins and antibodies for collaborative research with any interested member countries.
- Larval and post-larval stages of freshwater prawn are highly susceptible to MrNV/XSV and adults are resistant to MrNV/XSV and also WSSV. We need financial support to carry the research to find out the factors responsible for resistance. This study would help to develop control and preventive strategies against MrNV/XSV in larval and post-larval stages. This would help to revive the freshwater prawn culture in large-scale in prawn growing countries.
- We have *well-equipped laboratory* to train scientific and non-scientific staff in molecular diagnostic and cell culture techniques.
- We have *repository for fish cell lines and holding 75 cell lines* from a variety of fish.
- We also have *viral repository holding important viral pathogens of shrimp, prawn and fish.*

Contact information

Website: www.aahl.res.in

Email: cah_sahul@hotmail.com

