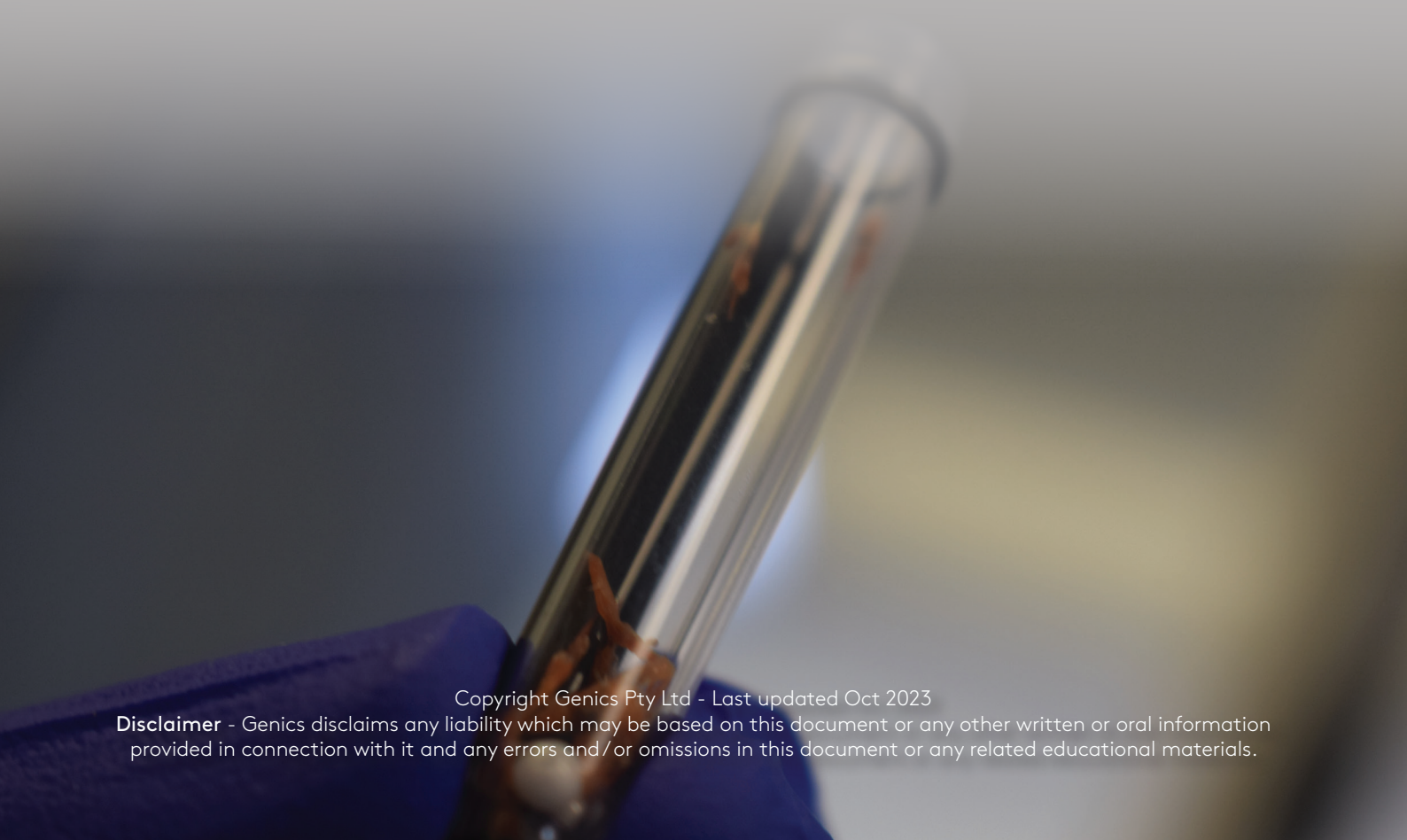
GENICS

Education Series

Monodon baculovirus or (MBV)

www.genics.com



Shrimp get sick too. Monodon Baculovirus (MBV) is a pathogen that causes some production losses mainly in *Penaeus monodon*. It was first described in 1977 in Taiwan, and it was the first virus of penaeid shrimp to be reported. The virus is a rod-shaped, single enveloped and occluded (intranuclear occlusion bodies) large circular dsDNA virus that replicates within the nucleus, and it targets several organs, including the hepatopancreatic tubule epithelium and duct epithelium of postlarvae, juveniles and adults, and the anterior midgut epithelium of very young postlarvae.

MBV started in Taiwan, but now we know that it is also present in South East Asia, South Pacific, Africa and Latin America. It was involved in the first event of massive production loss in shrimp in Taiwan, but later it was discovered that MBV was not the unique cause of that event, with other pathogens also present. Also, it has been discovered that it does not cause mortalities if the rearing conditions are good. In Taiwan the coinfection of MBV and White Spot Syndrome Virus (WSSV) is a common occurrence in *P. monodon*.

MBV is characterized by not causing high mortalities but generating a decrease in productivity. Infections are reported to be well tolerated by shrimp if the culture conditions are optimal. It is reported that crowding and poor conditions can increase the severity of MBV infection, and that the MBV infection itself can increase the susceptibility of shrimp to secondary infections. The disease remains latent until a stressor event affects the infected animal, and then the disease is developed. It has been recorded that MBV infected larvae of *P. monodon* and *Penaeus penicillatus,* and broodstock of *P. monodon* showed significant mortality due to transfer stress.

Even though MBV does not cause mortality and serious disease, infection can result in substantial economic loss due to poor growth performance in shrimp cultivation ponds, and perhaps due to low survival of postlarvae as a result of secondary infections with *Vibrio* and various protozoa. It has been reported in association with HPV and YHV.

Causative agent of infection with MBV is Monodon Baculovirus which has had different names, including *Penaeus monodon* nucleopolyhedrovirus (PemoNPV) in the genus *Nucleopolyhedrovirus*, and *Penaeus monodon* singly enveloped nuclear polyhedrosis virus (PmSNPV). It was thought to be specific to *P. monodon*, but it has been recorded in other species.

The major mode of transmission of the virus is horizontal through oral exposure to occlusion bodies, contaminated tissues or fomites. The occlusion bodies are released through fecal matter of infected broodstock as well as larvae, and these are ingested by other larvae.

Susceptible species for MBV infection. Although wild *P. monodon* appeared to be the primary host of this virus, it has also been recorded from *P. penicillatus*, *P. indicus*, *P. semisulcatus*, *P. merguiensis*, *P. kerathurus*, *P. esculentus*, *P. vannamei*, *Metapenaeus ensis* and *M. lysianassa*. Recently, the virus has been recorded in *Macrobrachium rosenbergii*.

Clinical signs of infection with MBV. The main signs are multiple spherical occlusion bodies and hypertrophied nuclei of infected cells in the hepatopancreas and midgut epithelial cells seen at the histopathological inspection. Infected cells show necrosis, lysis and sloughing-off of cells into the tubule lumen. The three stages of its pathogenesis can be seen in the hepatopancreas: stage 1 - hepatopancreatocytes with slightly hypertrophied nuclei containing a few completed virions but without any occlusions; stage 2 - hypertrophied nuclei with developing occlusions and developed virions; and stage 3 - hepatopancreatocytes with mature occlusions and abundant number of completed free and occluded virions. The last stage is followed by cell necrosis and cytolysis.

As for the gross signs of infections, these can be lethargy, reduced feeding and preening activities, and reduced growth rate. It has also been reported that infection with MBV is a pre-disposing factor for the occurrence of gill and surface fouling organisms, which results in 'shell disease type' lesions or in bacterial septicemias.

Early detection using Shrimp Multipath™ can give farmers early notice of infection before the first clinical signs appear. This information is an early warning system preparing farmers for a critical period, where slowing the spread of the disease and maximizing production outputs are still possible.

Target life-history stages for accurate early detection include late postlarvae and young juvenile stages. MBV has not been documented in early larval stages and no occlusion bodies have been detected before postlarval stage 2. The severity of the disease decreases with age, so the exposure of larval and postlarval stages is likely to result in severe infection and mortality, whilst the exposure of juveniles and adults will be less severe.

Target organs for sensitive Shrimp **Multi**Path™ detection are the hepatopancreas of postlarvae, juveniles and adults, and the anterior midgut of very young postlarvae.

Sampling and preservation of tissues for Shrimp **Multi**Path™ should be done in labelled vials or tubes with screw cap seals and fixative should be 70% laboratory grade ethanol. Tissue size can be 2-5 mm^2 in size. Sample equipment must be sterilized using appropriate methods between sample tubes.

Sampling numbers and health management plans should be established with your health expert who will take into account factors such as nauplii/postlarvae source, climate, farm size and location, company structure, market channels for sale of product, etc. There is also the option to pool samples for Shrimp **Multi**Path™ testing to maximize value for money with PCR testing.

Longer term solutions include eradication of infected stocks, strict disinfection regimes in the hatchery using different chemicals at appropriate concentrations, due to the resistance of the virus to typical chemicals used for disinfection, because it is embedded in occlusion bodies. Even though MBV is not a serious pathogen, it can cause severe damage when the infected animals are stressed due to poor rearing conditions, and by predisposing to secondary bacterial infections and other viruses. Thus, it should be eliminated from the farming system because it is unlikely that shrimp will carry heavy infection without any ill effect. Along with disinfection, eradication of infected broodstock, stocking of disease-free postlarvae and maintaining optimum water quality parameters need to be practiced to reduce production loss due to MBV.

Contact Genics at info@genics.com if you would like to discuss shrimp health management options for your operation or visit www.genics.com for further details.

Learn how to dissect your shrimp for testing

Visit our new Educational page here to learn how to:

- Sterilize your equipment before sampling
- Selecting the correct ethanol for tissue preservation
- Identifying and sampling shrimp target organs for Shrimp **Multi**Path™ testing

Questions?

info@genics.com
www.genics.com
MBV

Did you know?

Shrimp rarely harbour only one pathogen and farmers often don't know which ones they are. This is a significant economic risk for farmers. **Genics has solved this problem** with Shrimp **Multi**Path™. It's the ultimate early warning system for farmers, **detecting up to 16 pathogens in a single test** that is unparalleled in today's industry for its sensitivity and accuracy.