



DISEASE ADVISORY

Infectious Myonecrosis (IMN): Status and Threat



Infectious myonecrosis (IMN) is a viral disease caused by infectious myonecrosis virus (IMNV), a putative totivirus. IMNV particles are icosahedral in shape and 40 nm in diameter.

Host Range

- Pacific white shrimp, *Penaeus vannamei* (principal host);
- Tiger prawn, *P. monodon* and blue shrimp, *P. stylirostris* (experimental infection).

Disease Signs

Farm Level:

- Large numbers of sick animals and significant mortalities in pond-reared *P. vannamei* (juveniles and adults);
- Losses due to mortality range from 40 to 70 %.

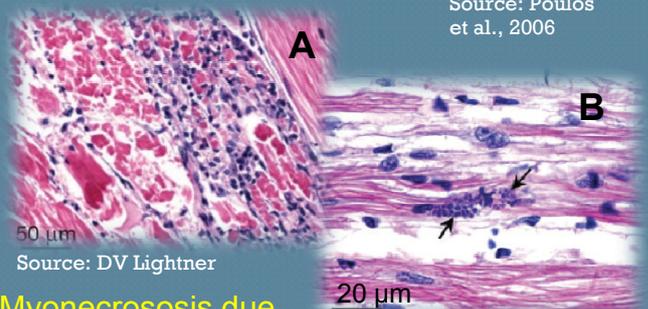


Source: DV Lightner

Clinical:

- Presence of focal to extensive white necrotic areas in striated (skeletal) muscles, especially in the distal abdominal segment and tail fan, which can become necrotic and reddened in some affected shrimp.
- These signs may have sudden onset following stresses (e.g. capture by cast net, feeding, sudden change in temperature or salinity).

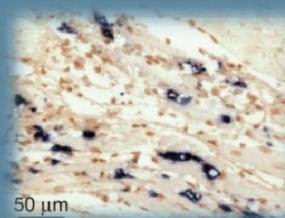
Histopathology



Source: DV Lightner

Myonecrosis due to IMNV infection in *P. vannamei*, H&E stain:

- A) Coagulative necrosis of skeletal muscle by haemocytic infiltration and fibrosis, in contrast to normal skeletal muscle which can be observed at the upper right corner.
- B) Perinuclear pale basophilic to dark basophilic inclusion bodies (arrows) observed in striated muscle cells.



Source: DV Lightner

In-situ hybridisation of skeletal muscle tissue using a digoxigenin-labelled IMNV probe. A black precipitate is present in areas where the probe has hybridised with the target virus.

Diagnostic Methods

- Tentative diagnosis by histology (acute and chronic phases);
- Molecular detection of IMNV by *in-situ* hybridisation, nested RT-PCR and real time RT-PCR;
- RT-PCR recommended for targeted surveillance. Diagnostic kits are commercially available (e.g. GeneReach Biotechnology Corporation, <http://genereach.com/about1.html>).



Source: Poulos et al., 2006

Infectious Myonecrosis (IMN)

Presence in the Asia-Pacific

- Originally reported from north-eastern Brazil, the first outbreak in Asia-Pacific was reported in East Java (Situbondo District), Indonesia in May 2006. It was contained in this area until 2008.
- In 2009, however, more districts in East Java were affected including Situ, Banyuwangi, Blitar and Malang, as well as some districts in the provinces of Bali, Lampung, West Nusa Tenggara and Central Java.
- Based on Quarterly Aquatic Animal Disease (QAAD) reports submitted to NACA, the following Indonesian provinces are now affected by IMNV:
 - East Java
 - Bali
 - Lampung
 - Central Java (Jepara, Blora, Kendal and Rembang)
 - West Kalimantan (Bengkayang)
 - West Nusa Tenggara (West Sumbawa)

Current Threat

- With the current spread of the disease to other provinces in Indonesia, there is a high threat of spreading the disease to neighboring *P. vannamei*-producing countries;
- *P. vannamei* is now the most popularly cultured shrimp species in many Asian countries, including Malaysia, Thailand, the Philippines, Vietnam and China among others;
- Increased awareness and preparedness on IMN disease and outbreak are needed in these countries.

Key References

AGDAFF-NACA (2007). Infectious myonecrosis. Aquatic Animal Diseases Significant to Asia-Pacific Region: Identification Field Guide, Australian Government of Agriculture, Fisheries and Forestry, Canberra, Australia.

OIE (2010). Chapter 2.2.3 – Infectious myonecrosis. Manual of Diagnostic Tests for Aquatic Animals 2010. World Organisation for Animal Health, Paris, France.

Poulos, B.T., Tang, K.F.J., Pantoja, C.R., Bonami, J.R., Lightner, D.V. (2006). Purification and characterization of infectious myonecrosis virus of penaeid shrimp. J. Gen. Virol., 87: 987-996.

Saengchan, S., Phewsaiya, K., Briggs, M., Flegel T.W. (2007). Outbreaks of infectious myonecrosis virus (IMNV) in Indonesia confirmed by genome sequencing and use of an alternative RT-PCR detection method. Aquaculture, 226: 32-38.



Source: DV Lightner

What to do when there is (suspected) Outbreak?

- Report immediately to Competent Authorities in respective countries, and to regional and international organizations involved in aquatic animal health: NACA (www.enaca.org); World Organisation for Animal Health (OIE, www.oie.int); Food and Agriculture Organization of the United Nations (FAO; www.fao.org)
- Collect tissue samples with guidance from Fish Health experts, for submission to accredited national or regional laboratories:
 - Best tissue samples for IMNV detection include striated (skeletal) muscle, connective tissues, haemocytes, and lymphoid organ;
 - For non-lethal testing (can be used for surveillance), haemolymph or excised pleopods may be collected.

Prevention and Control

- Better husbandry practices and use of specific pathogen free (SPF) broodstock have been proven to be the most successful methods to prevent infection;
- There are no reported control measures for IMNV.

