

Emerging Risk Notice

August 2020

Infectious hypodermal and hematopoietic necrosis virus (IHHNV)

Key Points

- In 2019, shrimp farms in Texas, Florida and New Mexico were quarantined with all affected tanks depopulated after the detection of IHHNV in shrimp. A research facility in California was also quarantined and depopulated after receiving shrimp from a previously infected farm.¹
- IHHNV is a DNA virus of the family *Parvoviridae* which affects farmed and wild penaeid shrimp (of the *Penaeidae* family).² It has been reported in many regions of the world including Africa, Asia, Australia, Europe, and the Americas.¹
- IHHNV is reportable to the OIE (World Organisation for Animal Health). It is not known to pose a human health risk.

Concerns for U.S. Animal Health

- IHHNV is an emerging global disease first described in association with outbreaks of penaeid shrimp mortality in 1981 in Hawaiian shrimp culture facilities.³
- The U.S. is the only country in the Americas since 2006 considered by the OIE to have IHHNV-free zones.¹
- The mortality rate associated with IHHNV varies, but may be as high as 80-90%.³ Low mortality with high morbidity entailing deformities and growth suppression, resulting in high commercial losses, has also been reported.⁴
- Commercial U.S. shrimp production in 2017 was valued at \$531 million.⁵

Epidemiology

- USDA-APHIS-VS is working to complete epidemiologic investigations.
- IHHNV has been identified globally in farmed and wild shrimp; mortality and morbidity varies depending on species.⁶
- Species which meet the OIE criteria for listing as susceptible to IHHNV include: yellowleg shrimp (*Penaeus californiensis*), giant tiger prawn (*P. monodon*), northern white shrimp (*P. setiferus*), blue shrimp (*P. stylirostris*), and white leg shrimp (*P. vannamei*). Research suggests other potential host species may exist, but these have not yet met the OIE criteria for listing as susceptible to IHHNV.⁶
- Signs of acute IHHNV infection are most prominent in juveniles of *P. stylirostris* and include lethargic surface swimming, motionlessness or sinking shrimp, muscle opacity, and high mortality rates.⁷
- Chronic IHHNV infection causes runt deformity syndrome (RDS) in some species, most notably in *P. vannamei*, selected lines of *P. stylirostris*, and some populations of *P. monodon*. Clinical signs include cuticle deformities, deformed rostra, and variable and reduced growth rates.⁸
- Resistance may vary between penaeid species and also within different genetic lines of penaeid species. *P. vannamei* is the principal global farmed shrimp species, largely due to its relative resistance to IHHNV infection.⁹
- IHHNV is transmitted horizontally and vertically through cannibalization, contaminated water, and infected eggs.^{3,10}



Diagnostic Testing

- IHHNV primarily targets connective tissue cells, gills, haematopoietic nodules and haemocytes, ventral nerve cord and ganglia, antennal gland tubule epithelial cells, and lymphoid organ parenchymal cells. Any of the tissues listed above, pleopods, hemolymph, or whole shrimp or prawns may be used for testing.⁶
- Diagnostic testing methods include polymerase chain reaction (PCR), dot-blot hybridization, *in-situ* hybridization, histopathology, and genetic sequencing.⁶
- Histopathological lesions include Cowdry type A intranuclear inclusions in gills, nerve cord, gastric mucosa, antennal gland, cuticular hypodermis, and hematopoietic and connective tissue.³
- Certain cuticular deformities are pathognomonic for infection with IHHNV, specifically, a deformed rostrum bent to the left or right which may be presented by *P. vannamei* and *P. stylirostris* with RDS.⁶

Treatment

- No treatments or vaccines are currently available for IHHNV.⁶

Prevention

- Appropriate aquaculture biosecurity practices and husbandry are recommended to prevent disease introduction and spread.

Proper biosecurity practices include:

- Purchasing live shrimp and germplasm from sources known to be free of IHHNV.
- Quarantining and monitoring all new shrimp stocks upon arrival to a farm, disinfecting and properly disposing of water used to transport live shrimp, noting increased mortality rates and using appropriate diagnostic testing.
- Pretreating all water sources and minimizing or eliminating water exchange between populations.⁹
- Routinely sanitizing equipment with appropriate disinfectants.¹¹

Sources

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