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Global Aquaculture Advocate ™

Health & Welfare

Necrotizing hepatopancreatitis: Diagnosis, distribution in shrimp

Friday, 1 August 2003

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NHP reported throughout the Americas

NHP-infected *L. vannamei* juvenile from which a portion of the carapace was removed to show the severe atrophy of the hepato-pancreas, reduced to approximately 50 percent of its normal volume. From *A Handbook of Shrimp Pathology and Diagnostic Procedures for Diseases of Cultured Penaeid Shrimp*, by Donald V. Lightner.

Necrotizing hepatopancreatitis (NHP), caused by an alpha-Proteobacteria, has become one of the most important bacterial diseases affecting shrimp farming in the Americas. In contrast to vibriosis and other bacterial diseases of shrimp, little is known about the biology and ecology of NHP and its agent. It remains a mystery where this agent resides in shrimp-farming systems, thereby making NHP a very difficult disease to prevent.

NHP's recurrent and seasonal appearances in shrimp farms hint to the possible implication of reservoir hosts. Early detection of the NHP agent and antibiotic treatment remain the only measures of control.

Detection and diagnosis

Traditionally, gross observations of affected shrimp have been useful for making a tentative diagnosis of NHP, but since similar signs can also be caused by other diseases such as vibriosis, the technique is not considered specific or reliable. Microscopic examination of wet mounts prepared with freshly dissected hepatopancreas is also useful, but this procedure has the same limitations as gross observations.

During the acute phase of the disease, NHP causes very distinctive lesions that are readily identified by conventional hematoxylin and eosin histology. However, the chronic phase of the disease is not as easily recognized, and other methods need to be used for confirmation.

DNA gene probes specific to the detection of NHP have proven useful for *in situ* hybridization in cases where confirmatory diagnosis is needed for very low levels of infection or during the chronic phase of the disease. Polymerase chain reaction methods have also been developed that have the advantage of not only being highly sensitive and specific, but also allowing nonlethal screening of valuable broodstock by the examination of fecal samples.

Lastly, monoclonal antibodies for the detection of NHP have been also developed at the University of Arizona in Tucson, Arizona, USA. They are now under characterization and optimization, and in the near future will probably be available in kit form for use at shrimp farms and hatcheries.

Geographic and host distribution

First documented in 1985 as a distinct disease in shrimp farms in Texas, USA, NHP has now been reported in at least 12 countries in the Americas: Belize, Brazil, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, U.S.A. and Venezuela. Recently, NHP was also detected in captive populations of *Litopenaeus vannamei* in Eritrea.

So far, the reported species of penaeid shrimp affected by NHP continue to include only American species: *L. vannamei*, *Farfantepenaeus aztecus*, *L. setiferus*, *L. stylirostris* and *Fa. californiensis*. However, experimental infections under laboratory conditions indicate that *Penaeus monodon* and *Fenneropenaeus chinensis* also may be susceptible.

Careless importations of Pacific white shrimp, *L. vannamei*, into China, Taiwan, and other countries of the Eastern Hemisphere have already resulted in the introduction of Taura Syndrome Virus into those regions. If uncontrolled importations continue, there is a risk that NHP may be introduced, as well, with an uncertain effect on the local *P. monodon* and *Fe. chinensis* species.

More research needed

One of the obstacles to better understanding of NHP is the lack of a method/system to multiply and study the bacteria *in vitro*. Such a system would be useful for studying the life cycle of the NHP agent, and consistently producing bacteria for infectivity studies and testing of treatment and control strategies.

Identification of the agents that serve as reservoirs or vectors of the disease would allow the design of better control strategies at shrimp farms. Also, more research is needed on the mechanisms of transmission of the disease from shrimp to shrimp, both under maturation at hatcheries and in grow-out conditions.

(Editor's Note: This article was originally published in the August 2003 print edition of the Global Aquaculture Advocate*.)*

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