



# Hepatopancreatic Microsporidiosis (HPM)

## What is microsporidiosis and EHP?

Hepatopancreatic microsporidiosis (HPM) is caused by *Enterocytozoon hepatopenaei* (abbreviated as EHP). The microsporidian parasite was reported to affect black tiger shrimp *Penaeus monodon* in Thailand in the year 2009. Since then, EHP is widespread in most of the Southeast Asian countries, including India. It is referred as hepatopancreatic microsporidiosis (HPM) since the parasite is confined to the shrimp hepatopancreas (HP).



The economic losses to aquaculture seem to be substantial, mainly due to retarded growth of shrimp and overall reduction in farm production.

## Which shrimp species are affected by EHP ?

Black tiger shrimp *Penaeus monodon*, white leg shrimp *P. vannamei* and banana shrimp *P. merguensis* are known to get affected.

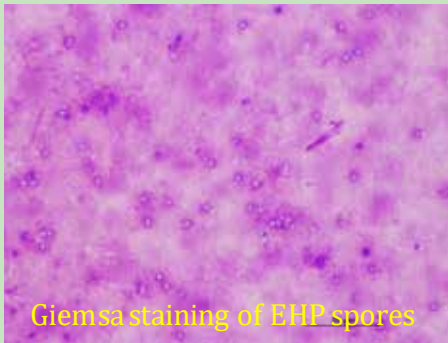
## What are the Clinical signs of EHP infection?

EHP does not cause mass mortalities. There are no specific clinical signs for EHP infection, but it is often associated with stunted growth and white feces syndrome. Hence EHP infection may be suspected when unusually retarded growth in the absence of other gross signs are observed. Severe infections by EHP can increase the susceptibility to other bacterial infections due to *Vibrio* spp. in shrimp farms and could manifest in mortality.

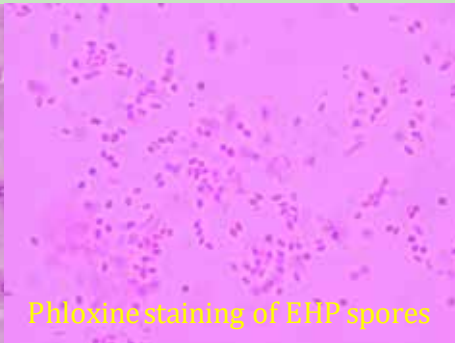
## How EHP is transmitted?

EHP is an intracellular spore-forming parasite. It replicates within the cytoplasm of the tubular epithelial cells of the hepatopancreas. Transmission of the disease mainly occurs by oral route. Polychaete worms can transmit EHP in shrimp hatcheries. Shrimp may also get infected by consuming feed contaminated with faeces and through cannibalism of infected shrimp or even by consuming spores present in the pond water and sediment. Recently it is reported that EHP can be transmitted from broodstock to larvae (vertical transmission)





Giemsa staining of EHP spores



Phloxine staining of EHP spores

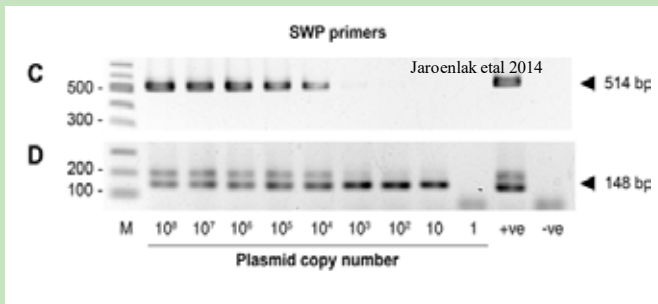


TEM of EHP spores

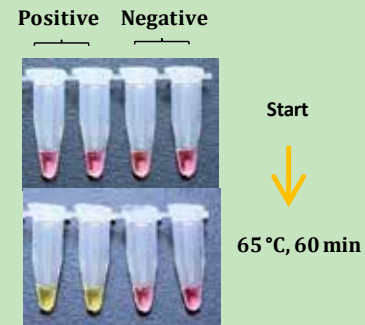
## How to Diagnose EHP ?

The EHP can be diagnosed by demonstration of spores in fecal sample and in hepatopancreas by microscopic examination. But microscopic demonstration remains successful only in severely affected cases and often undetectable in the early infection. The molecular diagnostic technique like PCR is however faster, easier

and far more accurate to detect the EHP in feces, postlarvae and hepatopancreatic tissue. Recently, CIBA has developed a loop mediated isothermal amplification (LAMP) test for EHP diagnosis. The LAMP test is equally sensitive and as effective as PCR and can be performed in field conditions as it does not require costly equipment like PCR. The preferred samples for disease diagnosis are postlarvae, fresh shrimp and faecal samples.



Detection of EHP by PCR

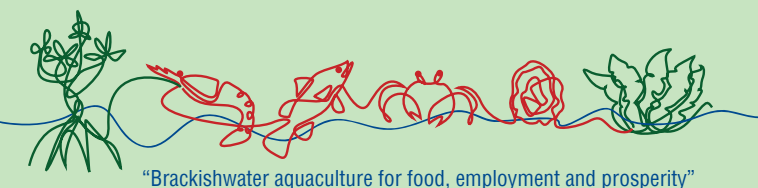


Detection of EHP by LAMP

## Prevention and Control of Hepatopancreatic Microsporidiosis (HPM)

Only EHP free seed should be stocked in the ponds. Once spores are in ponds it is very difficult to eradicate the disease. Hence farmers should adhere to strict biosecurity protocols and adopt better management practices (BMPs). Pond preparation should be carried out properly by drying and disinfection after every harvest to ensure that the EHP spores along with the carriers are destroyed. Treatment of pond sediments by application of CaO (quick lime) @ 6 ton/ha has been recommended.

The use of higher dose of lime is essential as spores will get killed only by raising the pH of soil to 12 or more. It is advised to plow the CaO into the dry pond sediment (10-12 cm) and then moisten the sediment to activate the lime. NACA also suggested >15 ppm  $KMnO_4$  or >40 ppm chlorine to inactivate spores in soil. The pond should be left for one week for drying before filling. Farmers are also advised to stock only PCR tested seeds in ponds with good plankton/bloom. In hatcheries, live feed such as polychaetes must be tested by PCR to ensure absence of EHP. Broodstock must also be ensured to be free from EHP by PCR.



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