

Grouper Iridoviral Disease - Disease Card¹

by

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Pathogen information

1. causative agent

- 1.1. pathogen type: virus
- 1.2. disease name and synonyms: grouper iridoviral disease
sleepy grouper disease
- 1.3. pathogen common name and synonyms: grouper iridovirus (GIV)
grouper iridovirus of Taiwan (TGIV)
Singapore grouper iridovirus (SGIV)
- 1.4. taxonomic affiliation
 - 1.4.1. pathogen scientific name: grouper iridovirus (GIV)
 - 1.4.2. phylum, class, family etc...: family: *Iridoviridae*, genus: *Ranavirus*
- 1.5. description of the pathogen: Causative agent is a enveloped double-stranded DNA (dsDNA) virus with a size of 160-200 nm in diameter. Viral replication occurs in the cytoplasm of the infected cell and virus grows well in cultured fish cell lines derived from grouper.
- 1.6. authority: F. H. C. Chua, M. L. Ng, K. L. Ng, J. J. Loo and J. Y. Wee (1994): Investigation of outbreaks of a novel disease, "Sleepy Grouper Disease", affecting the brown-spotted grouper, *Epinephelus tauvina* Forskal. *J. Fish Diseases*, **17**, 417-427.
- 1.7. pathogen environment: marine waters

2. modes of transmission

- 2.1. routes of transmission: Horizontal contact and water-borne transmission appear to be the principal mechanism for virus spread.
- 2.2. life cycle: replication in a cell
- 2.3. associated factors: unknown
- 2.4. additional comments: -

3. host range

¹ K. Nakajima (2003). Grouper iridoviral disease - disease card. Developed to support the NACA/FAO/OIE regional quarterly aquatic animal disease (QAAD) reporting system in the Asia-Pacific. NACA, Bangkok, Thailand. 4 pp.

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- 3.1. host type: fish (grouper)
- 3.2. host scientific names: *Epinephelus tauvina*, *E. awoara*
- 3.3. other known or suspected hosts: suspiciously included other species of genus *Epinephelus*
- 3.4. affected life stage: fry, juvenile and adult
- 3.5. additional comments:

4. geographic distribution

- 4.1. region: Southeast Asia
- 4.2. country: Singapore and Taiwan
- 4.3. additional comments: Thailand could be included as a distribution region, because iridovirus infection in cultured grouper, *E. malabaricus*, was observed in Thailand (Kasornchandra J. and Khongradit R. (1997): Isolation and preliminary characterization of a pathogenic iridovirus in nursing grouper, *Epinephelus malabaricus*. In "Diseases in Asian Aquaculture 3" (edited by Flegel T. W. and MacRae I. H.) pp.61-66.). A virus was successfully isolated in grouper fin and *Epithelioma papulosum cyprini* (EPC) cell lines. This virus grows well in these cells and produces cell-lytical CPE. These characteristics could be agreed with that of the Ranavirus.

Disease information

1. clinical signs and case description

- 1.1. host tissues and infected organs: Occurrence of systemic infection. Primary target organs are mostly spleen and kidney.
- 1.2. gross observations and macroscopic lesions: It causes extreme lethargy in the affected fish with few visible external signs except of darkened body color.
- 1.3. microscopic lesions and tissue abnormality: Enlarged spleen is consistently observed. Marked histological changes are seen in the spleen including necrosis of splenic pulp with generalized pyknosis, karyorrhexis and reduction of haemopoietic tissue elements.
- 1.4. OIE status: not listed

2. social and economic significance: The significance of this disease lies in its ability to cause losses in not only fry and juvenile of grouper but also marketable-sized grouper, a highly priced fish species in tropical mariculture.

3. zoonotic importance: none

4. diagnostic methods

4.1. screening methods

- 4.1.1. level I: none
- 4.1.2. level II: none
- 4.1.3. level III: none

4.2. presumptive methods

4.2.1. level I: Gross observations

High mortality of grouper occurs. The affected fish are extremely lethargic with mostly darkened body colour and have an enlarged spleen.

4.2.2. level II: Histopathology

Histopathological changes in the spleen as described in “Disease information 1.3.” are observed.

4.2.3. level III: Virology

Virus isolation is carried out with grouper cell line (GF, GP, GK or GL), and a virus is isolated with cell-lytic CPE on the cells. Conventional virological study (ether, IUdR and acid sensitivity, etc.) are helpful for identification of enveloped DNA virus.

Transmission Electron Microscopy

Icosahedral morphology, 160-200 nm, dsDNA enveloped viral particles are present in the cytoplasm of infected spleen.

confirmatory methods

4.2.4. level I: none

4.2.5. level II: none

4.2.6. level III: Polymerase Chain Reaction (PCR)

Anti –sera against the virus for diagnosis are not yet available. Viral DNA sequence is useful to identify as GIV according to the sequence data mentioned in the paper of Murali *et al.* (2002) and Qin *et al.*(2003).

5. control methods: Specific control method has not been established. Usual sanitation and control procedure for viral infection are available.

Selected references

Chua, F. H. C., M. L. Ng, K. L. Ng, J. J. Loo and J. Y. Wee (1994): Investigation of outbreaks of a novel disease, “Sleepy Grouper Disease”, affecting the brown-spotted grouper, *Epinephelus tauvina* Forskal. *Journal of Fish Diseases*, **17**, 417-427.

Kasornchandra, J. and R. Khongradit (1997): Isolation and preliminary characterization of a pathogenic iridovirus in nursing grouper, *Epinephelus malabaricus*. In “Diseases in Asian Aquaculture 3” (edited by Flegel T. W. and MacRae I. H.) pp.61-66.)

Chou, H.Y., C.C. Hsu and T.Y. Peng. (1998). Isolation and characterization of a pathogenic iridovirus from cultured grouper (*Epinephelus* sp.) in Taiwan, *Fish Pathol.* 33(4): 201-206

Lai, Y. -S., S. Murali, H.-Y. Ju, M.-F. Wu, I.-C. Guo, S.-C. Chen, K. Fang and C.-Y. Chang (2000): Two iridovirus-susceptible cell lines establishes from kidney and liver of grouper, *Epinephelus awoara* (Temminck & Schlegel), and partial characterization of grouper iridovirus. *Journal of Fish Diseases*, **23**, 379-388.

Murali, S., M.-F. Wu, I.-C. Guo, S.-C. Chen, H.-W. Yang and C.-Y. Chang (2002): Molecular characterization and pathogenicity of a grouper iridovirus (GIV) isolated from yellow grouper, *Epinephelus awoara* (Temminck & Schlegel). *Journal of Fish Diseases*, **25**, 91-100.

Qin, Q. W., T. J. Lam, Y. M. Sin, H. Shen, S. F. Chang, G. H. Ngoh and C. L. Chen (2001): Electron microscopic observations of a marine fish iridovirus isolated from brown-spotted grouper, *Epinephelus tauvina*. *Journal of Virological Methods*, **98**, 17-24.

Qin, Q. W., S. F. Chang, G. H. Ngoh-Lim, S. Gibson-Kueh, C. Shi and T. J. Lam (2003): Characterization of a novel ranavirus isolated from grouper *Epinephelus tauvina*. *Diseases of Aquatic Organisms*, **53**, 1-9.