

AETIOLOGY

CLASSIFICATION OF THE CAUSATIVE AGENT

Spring viraemia of carp is in the family Rhabdoviridae, genus *Vesiculovirus*.

RESISTANCE TO PHYSICAL AND CHEMICAL ACTION

Temperature: Inactivation at 60°C/30 minutes.

pH: Inactivated by pH 12 for 10 minutes and pH 3 for 3 hours.

Chemicals: Inactivated by oxidising agents, sodium dodecyl sulphate, non-ionic detergents, and lipid solvents.

Disinfectants: Inactivated by formalin 3% for 5 minutes; sodium hydroxide 2% for 10 minutes; chlorine 540 mg/litre for 20 minutes and iodine compounds 250 ppm for 30 minutes.

Survival: Remains viable for more than 4 weeks in water at 10°C and for more than 6 weeks in pond mud at 4°C.

EPIDEMIOLOGY

HOSTS

- Spring viraemia of carp (SVC) is a highly infectious virus disease predominantly affecting cultured common carp, but several other cyprinid species and some non-cyprinid species are also susceptible.
- Naturally occurring infections have been recorded from common carp and koi carp (*Cyprinus carpio*), crucian carp (*Carassius carassius*), sheatfish, (also known as European catfish or wels) (*Silurus glanis*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Aristichthys nobilis*), grass carp (white amur) (*Ctenopharyngodon idella*), goldfish (*Carassius auratus*), orfe (*Leuciscus idus*), and tench (*Tinca tinca*).
- It is reasonable to assume that other cyprinid species in temperate waters may be susceptible to infection.
- Some other species can be infected experimentally e.g. Pike (*Esox lucius*), guppy (*Lebistes reticulatus*) and pumpkinseed (*Lepomis gibbosus*).

TRANSMISSION

- Horizontal transmission may be direct or vectorial, water being the major abiotic vector.
- Direct contact with secretions from clinically infected fish.
- Animate vectors include the parasitic invertebrates: the carp louse *Argulus foliaceus* (Crustacea, Branchiura) and the leech *Piscicola piscicola* (Annelida, Hirudinea).
- Fish-eating birds may also be a vector.
- Asymptomatic virus carrier fish may introduce the virus into healthy stocks.

- Vertical or egg-associated transmission has not been demonstrated but cannot be ruled out.

SOURCES OF THE VIRUS

- Virulent virus is shed via faeces, urine, sexual fluids and probably gill and skin epithelia.
- Contaminated transport water, nets, containers and other equipment.

OCCURRENCE

- The disease has been recorded from most European countries and from certain of the western Independent States of the former USSR (Belarus, Georgia, Lithuania, Moldova, Russia and the Ukraine).
- The disease is not endemic in all of the countries from which it has been reported.
- Disease outbreaks typically occur in spring at water temperatures between 11°C and 17°C in fish that have been exposed to low water temperatures for prolonged periods during the preceding winter. Mortalities decrease above 17°C and cease at about 22°C.
- Young fish up to 1 year are most susceptible to clinical disease, but all age groups can be affected.
- Poor physiological condition of overwintered fish is a contributory factor to disease susceptibility.

For detailed information on occurrence, see recent issues of *World Animal Health* and OIE Web site.

DIAGNOSIS

CLINICAL DIAGNOSIS

- Increase in mortality in the population
- Fish become lethargic, separate from the shoal and gather at the water inlet or sides of a pond
- Fish may experience loss of equilibrium
- Abdominal distension or dropsy
- Protruding vent (anus) often with trailing mucoid faecal casts
- Haemorrhages on the skin, base of the fins and the vent
- Exophthalmia
- Overall darker coloration
- Pale gills

LESIONS

- There are no pathognomonic gross lesions.
- Final diagnosis must await direct detection of viral antigen in tissues or virus isolation and identification.
- Lesions may be absent in cases of sudden mortality.
- Excess ascitic fluid in the abdominal cavity usually containing blood.

- Inflammation of the intestines, which contain mucus instead of food.
- Oedema and haemorrhage of the visceral organs.

- Petechial or focal haemorrhages in the muscle and fat tissue.
- Petechial haemorrhages in the swim bladder.
- Degeneration of the gill lamellae.

DIFFERENTIAL DIAGNOSIS

- Carp erythrodermatitis (Summer ulcer disease)
- Motile *Aeromonas* Septicaemia (MAS)
- Edwardsiellosis
- Irritation caused by fish louse (*Argulus*) infection
- Environmental stress factors (high ammonia levels, high pH, low oxygen) particularly in recirculation systems
- Transportation and handling stress

LABORATORY DIAGNOSIS

Procedures

Isolation and identification of the agent

- Inoculation of susceptible cell lines such as EPC or FHM followed by:
 - Microscopic examination
 - Virus neutralisation
 - Immunofluorescent staining
 - Immunoperoxidase staining
 - Enzyme-linked immunosorbent assay (ELISA)

Direct detection in clinical material

- Immunofluorescent staining
- ELISA

Samples

Isolation and identification of the agent

- Spleen, kidney and encephalon samples
 - Pieces of tissue are fixed for histopathological examination and/or immunostaining.
 - A portion of the sample is placed in transport medium for virus isolation.
 - A portion is placed in extraction buffer for ELISA.

PREVENTION AND CONTROL

- No treatment available

SANITARY PROPHYLAXIS

- Routine cleaning and disinfection of site.
- Reduction in stocking density.
- Stocking with fish of known health status (SVC-free).
- Quarantine new stocks for at least 2 weeks prior to introduction.
- Control of human traffic (e.g. anglers).
- Avoid mixing fish from different sites.

In outbreaks

- Strict isolation of outbreaks with fish movement controls and control of human traffic.
- Destruction of all infected and exposed fish.
- Thorough cleaning and disinfection of site.
- Secure disposal of carcasses.

MEDICAL PROPHYLAXIS

- A completely effective vaccine is not yet available, but some countries have reported a reasonable degree of protection with inactivated or live attenuated virus.

REFERENCES

Chapter 2.1.4. in the OIE *Diagnostic Manual for Aquatic Animal Diseases*, OIE, Paris, France.

Chapter 2.1.4. in the OIE *International Aquatic Animal Health Code*, OIE, Paris, France.

WOLF K. (1988). *Fish Viruses and Fish Viral Diseases*, Part 1, Section 1.17. Cornell University Press, Ithaca, New York, USA, 191–216.

OIE Reference Experts and Laboratories in 2000

Prof. B.J. Hill

The Centre for Environment, Fisheries and Aquaculture Sciences (CEFAS), Weymouth Laboratory, Barrack Road, The Nothe Weymouth, Dorset, DT4 8UB
 UNITED KINGDOM
 Tel.: (44.1305) 20.66.26, Fax: (44.1305) 20.66.27
 E-mail: b.j.hill@cefass.co.uk