Southeast Asian Fisheries Development Center **Aquaculture Department**

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Spring viremia of carp: SVC

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SPRING VIREMIA OF CARP (SVC)

The Spring viraemia of carp (SVC) is an acute, systemic rhabdovirus infection that can kill several carp species, some cyprinid species and ictalurid fish species. The disease usually occurs in the spring when water temperature is 7-23°C but may also be observed in other seasons.

SVCV has been reported in:

•China •Italy •France •Spain •Romania •Slovak Republic •Hungary •Israel •United Kingdom •USA

Cause: Spring viremia of carp virus (SVCV) or Rhabdovirus carpio (80-90 nm); Family: *Rhabdoviridae*

Species Affected:

Common carp and Koi carp (*Cyprinus carpio*)
Grass carp (*Ctenopharyngodon idellus*)
Silver carp (*Hypophthalmichthys molitrix*)
Bighead carp (*Aristichthys nobilis*)
Crucian carp (*Carassius carassius*)
Goldfish (*C. auratus*)
Roach (*Rutilus rutilus*)
Ide (*Leuciscus idus*)
Tench (*Tinca tinca*)
Sheatfish (*Silurus glanis*)
Brown trout (*Salmo trutta*)

Goldfish

Common Carp

Species Killed by SVCV: Natural Infections

Koi Carp

Bighead Carp

Silver Carp

Crucian Carp

Tench

Wels catfish

Species Killed by SVCV: Experimental Infections

Pike

Positive by Bath

Guppy

Grass Carp

Roach

Zebra danio

Pumpkinseed

Positive by Injection

Golden Shiner

Fish species susceptibility?

The common carp is the most susceptible species to SVC and is the principal host. This is followed by grass carp and bighead x silver carp hybrids.

What are the clinical signs of SVC-infected fish?

Infected fish swim more slowly, form groups in slow-flowing water near the bank of the pond or lie on their sides at the pond bottom. These have darkened skin, weak with swim bladder inflammation, loss of balance, petecchial hemorrhage in the gills/skin (a), swollen abdomen due to water accumulation, swollen eye/s (b, *photo courtesy of CEFAS, UK*), pale gills and trailing white or yellowish fecal casts. Mortalities may range from 30-70%.

What happens to infected fish?

These develop internal pathological signs such as hemorrhaging, inflammation of the peritoneum, copious mucus in intestine and enlargement of the spleen. Histological lesions occur causing intestinal and spleen degeneration and clogged kidneys. Clinically-infected fish are carriers of SVCV. The virus is shed via the feces, urine, gill, skin mucus and exudate of skin blisters or swollen scale pockets. During infection, the SVCV is most abundant in the liver, kidney, spleen, gill and brain. Virus replication occurs in the endothelial cells of blood capillaries, spleen tissue and kidney cells. The SVCV may remain infectious in the water for more than 4 weeks and in the mud for 6 weeks or more.

Water temperature is a very important factor for SVC!!!

Outbreaks of SVC usually occur when water temperatures ranges from 10°C to 17°C (1-2). Among yearlings or older fish, infection is not often observed above 17°C but fry can be affected at temperatures as high as 23°C. Above 23°C, clinical disease is rare (3).

How is the virus transmitted?

The virus is transmitted to healthy fish via infected fish in water or through parasites like *Argulus foliaceus* (Crustacea) and *Piscicola piscicola* (Annelida). The virus may also spread via contaminated equipment and predatory birds. Vertical transmission from the fish mother to the eggs is also possible.
Fish that recover from SVC may appear healthy but may remain infected with the SVC virus and continue to shed and spread the virus to other fish.

How is SVCV detected?

1. Isolation of the virus by cell culture.
2. Reverse transcription polymerase chain reaction (RT-PCR)
3. Direct immunofluorescence test (IF)
4. Enzyme-linked immunosorbent assay (ELISA)
5. Virus neutralisation test (VN)

Fish material suitable for diagnosis of SVC:

- **Asymptomatic fish** (apparently healthy fish): Kidney, spleen, gill and brain (any size fish)
- **Clinically affected fish:**
  - Whole fish (< or = 4 cm)
  - Entire viscera including kidney and brain (4 - 6 cm)
  - Larger fish, liver, kidney, spleen and brain

How to prevent SVC?

There is no known cure for SVC. Once SVCV is established in a pond farm stock, it may be very difficult to eradicate without destroying all kinds of life in the fish production site. The best way to protect fish from SVCV is through a comprehensive biosecurity plan:

- Buy fish from sources accredited as free of SVC virus.
- New fish should be quarantined in water of 10-17°C for at least 2 weeks before introducing them into a pond or tank that contains other susceptible fish.
- Use spring or well water that is free of virus.
- Prevent the entry of wildlife and other predators.
- Disinfect eggs by iodophore treatment.
- Disinfect ponds between crops and equipment between ponds or tanks.
- Dispose dead fish properly.
- Avoid contact with other fish especially in fish trade shows.
- Avoid sharing equipment.
- Avoid stressing fish during culture.

On the national level, the importation of live fish should ensure that SVC-susceptible fish species from other countries do not enter the country without a health certificate indicating that these are free of SVCV. In addition, imported fish should be quarantined at the port of entry and checked for SVCV.

The SVCV can be destroyed at <pH 3 or >pH 12, by heat of >56°C, chlorine and ultraviolet light.

Spring Viremia of Carp

A notifiable disease to the OIE (Office International des Epizooties)

Summary: SVC

- 7-23°C
- Red skin lesions

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Spring Viremia of Carp: SVC

Previously known as:

- Infectious dropsy of carp
- Red contagious disease
- Infectious ascitis
- Hemorrhagic septicemia