

## 2.2.1 Channel Catfish Virus Disease

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### A. Name of Disease and Etiological Agent

Channel catfish virus disease (CCVD) is the common name of the disease. The etiological agent is channel catfish virus (CCV). This virus is a member of the *Herpesviridae* family and the name *Herpesvirus ictaluri* has been suggested.

### B. Known Geographical Range and Host Species of the Disease

#### 1. Geographical Range

Found in Alabama, Arkansas, California, Colorado, Georgia, Iowa, Kansas, Kentucky, Mississippi, Nebraska, Oklahoma, Texas, West Virginia, Minnesota, Idaho, and Honduras.

#### 2. Host Species

The channel catfish *Ictalurus punctatus* is the primary host, and experimental infection of the blue catfish *Ictalurus furcatus*, suggests that this species could be infected under natural conditions. European catfish *Silurus glanis* are marginally susceptible to CCV whereas other species are refractive.

### C. Epizootiology

Channel catfish virus disease is generally considered a highly communicable infection among young-of-the-year cultured catfish. The virus infects fry and fingerlings during summer months when water temperatures exceed 25°C. Although CCV is sometimes seen in one-year-old fish, it is rare. Fish less than 5 cm long may suffer over 90% mortality but as they become older the mortality is reduced. After mortality stops, CCV cannot be isolated from survivors. However, there is one report of CCV isolation from stressed adult channel catfish in the winter when water temperatures were below 8°C. The mortality pattern of infected young fish is characterized by a very rapid acceleration of deaths. The mortality may depend upon age and size of the fish, environmental conditions, fish density, strain of channel catfish, and invasion by secondary bacterial pathogens such as *Aeromonas hydrophila* and *Flexibacter (Cytophaga) columnaris*.

## D. Disease Signs

Infected fish swim erratically, sometimes rotating about the longitudinal axis and at times holding their head up in the water. Externally, diseased fish show abdominal distention, exophthalmia, (Figure 1) pale or hemorrhagic gills, and petechiae at the base of fins and throughout the skin, particularly on the ventral surface.

The body cavity is filled with clear to yellowish fluid (ascites), and hemorrhages are evident throughout the musculature, liver, kidney, and spleen. The liver, kidney, stomach, and intestine may be pale in advanced stages of the disease. The gastrointestinal tract is filled with a mucoid secretion and is void of food.

Histopathology is characterized by an increase in lymphoid cells in the kidney. Renal tubules are necrotic and edematous. Necrosis and edema occur in hematopoietic tissue surrounding the tubules. The liver shows diffuse necrosis, edema, and hemorrhage. Hemorrhage, edema, and possibly mucosal sloughing occur in the intestine. The spleen becomes congested and edematous, and macrophages are laden with degenerated erythrocytes. Cardiac tissue may become necrotic, and focal hemorrhages may occur in the cardiac musculature.



**Figure 1.** Channel catfish fingerling with abdominal distention and exophthalmia typical of CCV disease.

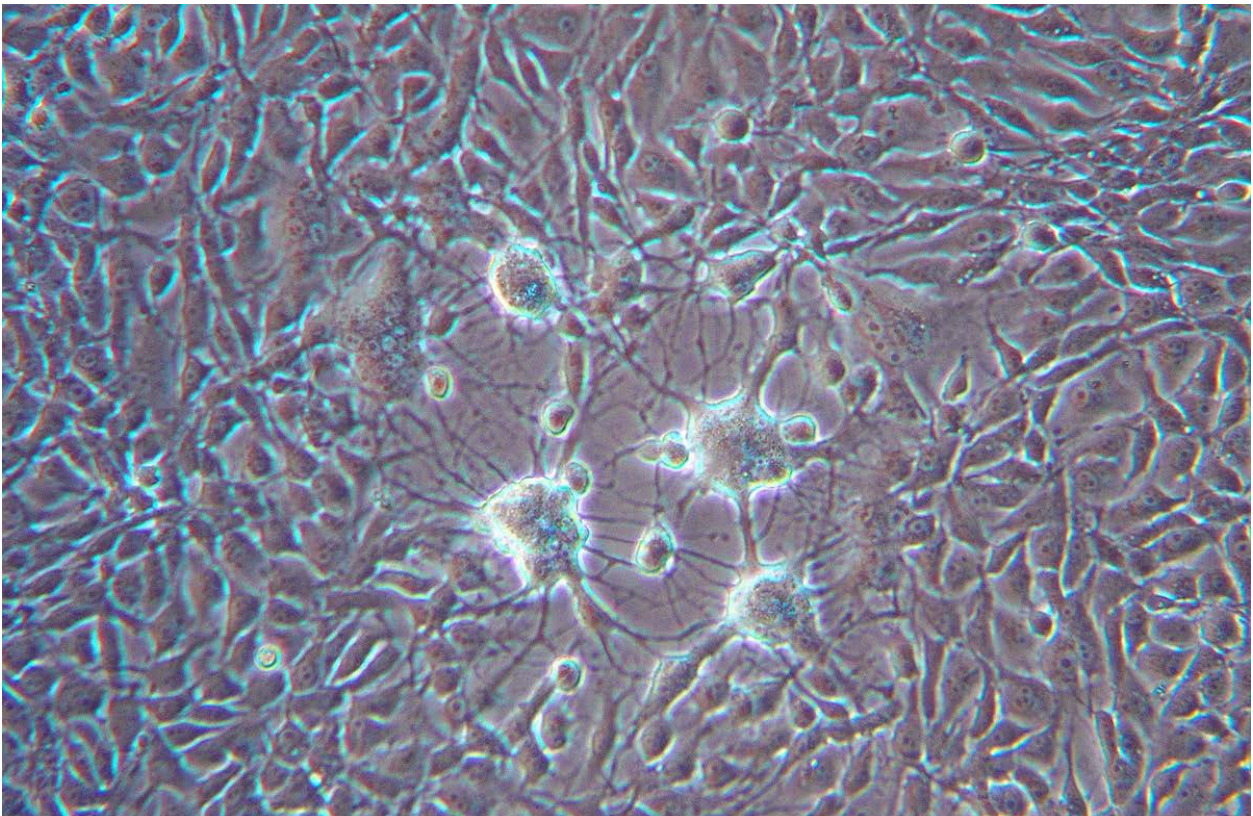
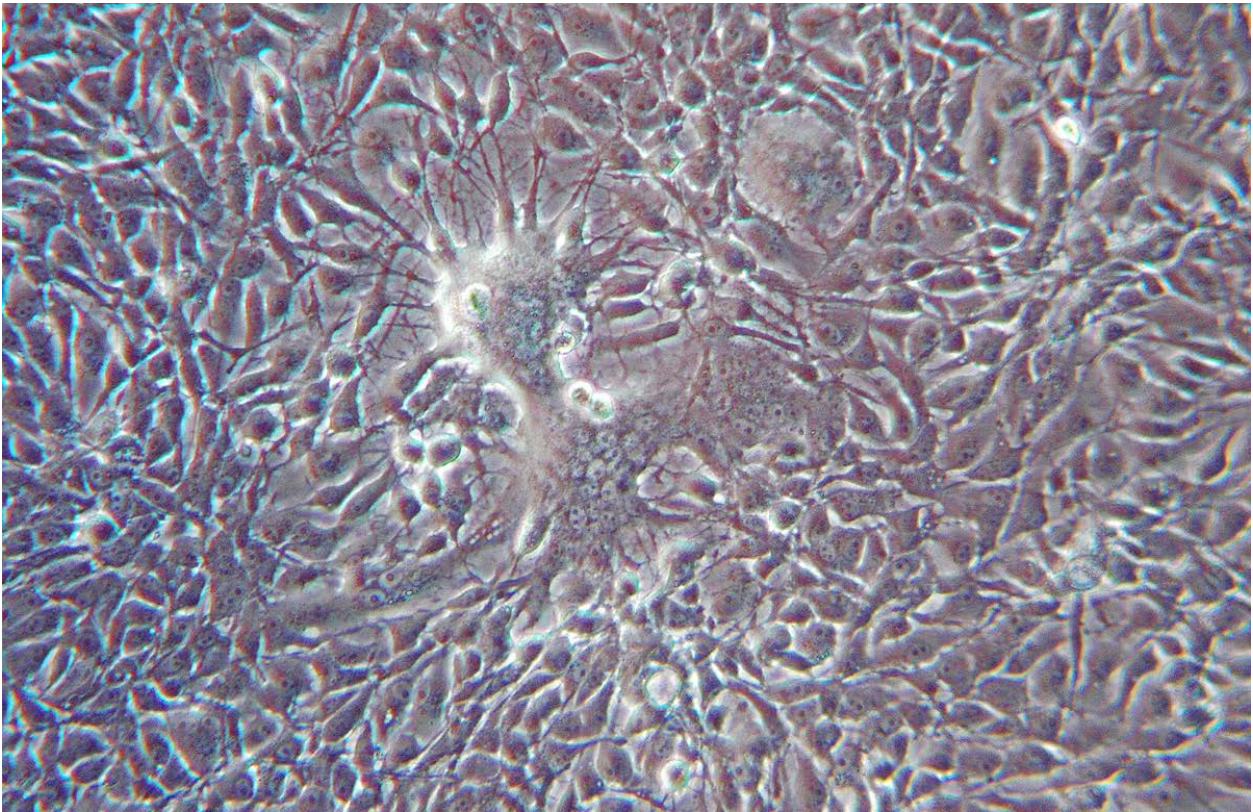
## E. Disease Diagnostic Procedures

### 1. Presumptive Diagnosis

Processed samples are inoculated onto brown bullhead (BB) cells (ATCC 59) or channel catfish ovary (CCO) cells and incubated at 25 to 30°C at pH 7.2 to 7.4. Channel catfish ovary cells are approximately ten times more sensitive than BB cells. Inoculated cultures are incubated for 14 days and observed for typical CPE (cell fusion and syncytium formation). The presence of clinical signs during a period when water temperatures exceed 24°C can serve as a presumptive diagnosis.

### 2. Confirmatory Diagnosis

The virus must be isolated and its identity confirmed by serum neutralization.



**Figures 2 and 3.** Phase contrast micrographs showing the cytopathic effect of CCV on CCO cells. The large multi-nucleate syncytia are typical of this virus.

## F. Procedures for Detecting Subclinical Infections

No procedures have been reported.

## G. Procedures for Determining Prior Exposure to the Etiological Agent

Prior exposure to CCV can be determined by detection of specific antibodies (Plumb 1973b; Amend and McDowell 1984). Serum samples from adult fish are heat inactivated at 45°C for 30 minutes. The serum is diluted 1:50 and reacted with known CCV at 100 TCID<sub>50</sub> or PFU/0.1 mL of the serum and virus mixture. Sera demonstrating greater than 50% plaque or TCID<sub>50</sub> reduction are considered to be from fish previously exposed to CCV. The CCV antibody titers in fish increase as water temperatures rise.

Prior exposure to CCV may also be indicated by detection of CCV DNA (Colyer et al. 1986; Bird et al. 1988). Several reports describe the use of molecular cloning of channel catfish virus genome and the use of nucleic acid probes to detect CCV genetic material in channel catfish. These techniques are not yet sufficiently refined for practical application.

## H. Procedures for Transportation and Storage of Samples to Ensure Maximum Viability and Survival of the Etiological Agent

See Section 1, 2.1 General Procedures for Virology.

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