

Aquabirnavirus

I. Causative Agent and Disease

Aquabirnavirus is a recent new genus in the virus family Birnaviridae. These unenveloped icosahedral (~60 nm) viruses (over 200 isolates) contain a bi-segmented double stranded RNA genome that encodes 5 proteins and have been isolated in cell culture from a variety of marine and freshwater fish and shellfish species worldwide. There are three and possibly four serogroups (A, B, C & D) comprising at least 16 serotypes of aquabirnaviruses. Molecular testing has determined there are currently 7 genogroups. Several of these viruses occurring in finfish cause disease (such as IPNV in salmonids) while those infecting molluscs are mostly apathogenic, although some isolates have been reported to cause cell pathology or mortality in stressed bivalves. Some of these viruses that are shed into the water column by a fish host may be bioaccumulated by nearby bivalve molluscs through the filter feeding mechanism. These viral agents in shellfish are most often isolated from asymptomatic adult animals during routine virus screening examinations.

II. Host Species

Currently, aquabirnaviruses have been isolated from many different fish and shellfish species including 32 families of finfish, 11 species of bivalve molluscs and at least 4 species of crustaceans. In Alaska, *Aquabirnavirus* has been isolated in fish cell lines from asymptomatic adult littleneck clams and an aquabirnavirus-like agent has been observed by transmission electron microscopy in a male blue king crab associated with an adenocarcinoma-like proliferative lesion (discussed in the crustacean section).

III. Clinical Signs

Bivalve molluscs are generally asymptomatic carriers and/or vectors of these viruses.

IV. Transmission

Transmission is horizontal animal to animal via water. Isolates from bivalve molluscs may also represent bioaccumulation from filter feeding after the virus is shed into the water column from a nearby fish host.

V. Diagnosis

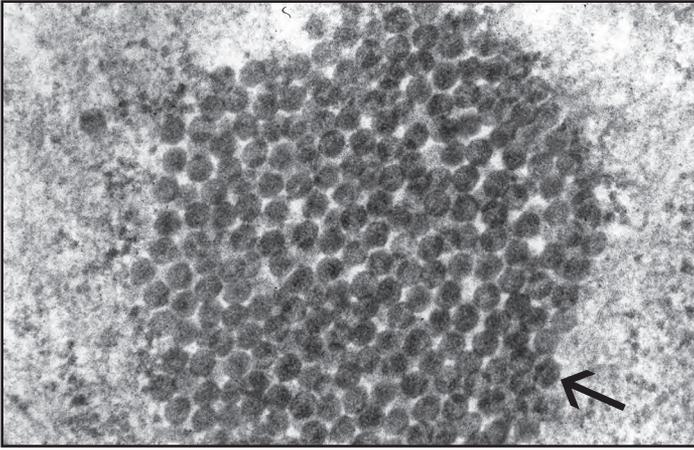
Detection of *Aquabirnavirus* is accomplished either by direct examination of shellfish tissues with transmission electron microscopy (TEM) or by isolating the virus in cultures of susceptible fish cell lines that have been inoculated with contaminated or infected shellfish tissue. Cytopathic effect (CPE) is generally a nondescript diffuse thinning and necrosis of infected cells. Identification is based on serology and TEM or by polymerase chain reaction (PCR). There are no established bivalve mollusc or crustacean cell lines for isolating viruses that may have a strict host specificity for shellfish, although there has been some success in culturing primary cell monolayers from certain shellfish species.

VI. Prognosis for Host

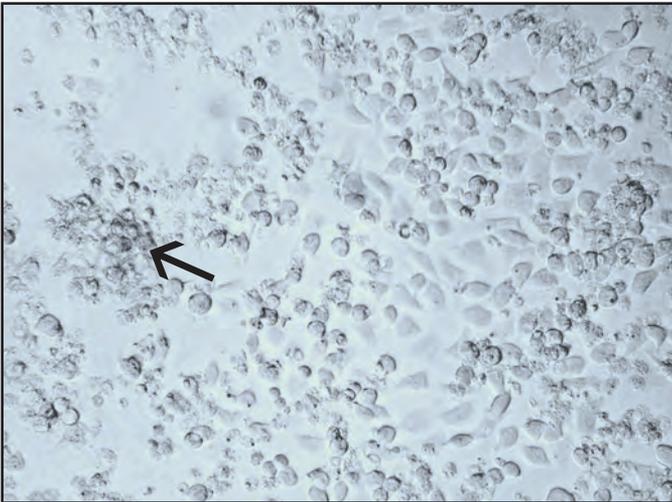
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VII. Human Health Significance

There are no zoonotic human health concerns associated with aquabirnaviruses in shellfish.



TEM of cultured bluegill fry cell with cytoplasmic aggregate of hexagonal-shaped aquabirna-like virus particles (arrow) isolated from littleneck clams



CPE in CHSE-214 cells showing areas of cell rounding and necrosis (arrow) typical of *Aquabirnavirus*