Erythrocytic Necrosis Virus (VENV)

I. Causative Agent and Disease

Erythrocytic necrosis or viral erythrocytic necrosis (VEN) is caused by several similar iridoviruses having double-stranded DNA and a hexagonal shape ranging in size from 130-330 nm. The viruses infect erythrocytes causing a hemolytic disease often resulting in anemia and secondary infections by other pathogens including VHSV Type IVa

II. Host Species

There are likely several different strains of the virus worldwide in the marine environment infecting a large variety of more than 20 anadromous and marine fish species. In Alaska, VENV has been detected in Pacific herring from several locations but has not yet been observed in salmonids. Results from experimental infections and occurrence of epizootics in young-of-the-year Pacific herring indicate that juveniles are more susceptible than older fish.

III. Clinical Signs

Adult herring generally show no clinical signs of disease. In juvenile Pacific herring, fish are anemic exhibiting nearly white gills and pale visceral organs. Liver color may be green due to breakdown of blood hemoglobin releasing excess biliverdin. Hemotocrits may be as low as 2 to 10%, erythrocytes are fragile causing hemolysis of blood samples, and immature erythrocytes predominate in peripheral blood. High mortality with dead fish on the shoreline accompanied by extensive congregations of predator birds may occur in areas where juvenile herring are weakened by the disease.

IV. Transmission

Transmission of this virus is likely horizontal from fish to fish based on the few experimental studies using waterborne exposure. Adult carrier fish of susceptible species are likely reservoirs of the virus that is transmitted to juvenile fish. Anadromous fish likely become infected during their marine phase of life. There is some suggestion that the virus is vector-borne and one instance of infection in juvenile salmonids in freshwater suggesting vertical transmission from adult anadromous parent fish.

V. Diagnosis

Diagnosis is made with blood smears showing characteristic eosinophilic inclusion bodies (1-4 um) present in the cytoplasm of erythrocytes when stained with Giemsa or Wright stains. Impression smears of hematopoietic head kidney can be substituted for blood. The virus is confirmed by the observation of iridovirus particles associated with inclusion bodies using electron microscopy (TEM). VEN viruses have not been successfully cultured in available fish cell lines, however an unvalidated PCR is available for the virus in Pacific herring.

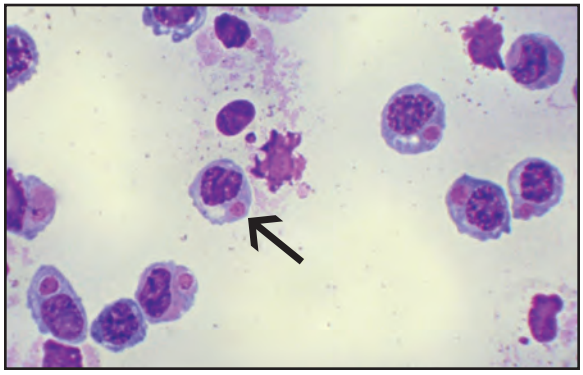
VI. Prognosis for Host

The virus in Alaskan juvenile Pacific herring caused one of the first natural epizootics reportedly associated with mass fish mortality. Chronic to subacute mortality in juvenile Pacific herring can also occur, especially when stressed.

VII. Human Health Significance

No human health concerns are associated with VEN virus.

Anemic Pacific herring with very pale gills and green livers from excessive biliverdin commonly seen with VEN



Erythrocytes of Pacific herring with large eosinophilic cytoplasmic inclusion bodies (arrow), some surrounded by pink lattices composed of virus particles; Diff Quik, X 400.

TEM of infected erythrocyte showing large virus particles (arrow) comprising the lattice surrounding inclusion bodies in stained smears, X 15,600.