

Aquatic Animal Health Glossary

Aeromonas salmonicida – bacterial agent responsible for causing furunculosis.

Adhesions - areas of internal tissues that stick together because of inflammation

Aquatic animal—any vertebrate or invertebrate, wild or domestic, that is dependent on an aquatic environment, freshwater or saline, for part or all of its life cycle.

Ascites - the accumulation of serous fluid in the peritoneal cavity, edema. May be caused by interference with venous return, obstruction in lymphatic drainage, disturbance in electrolyte balance, depletion of plasma proteins, or degenerative changes in the liver.

Attenuated - weakened; less pathogenic/disease-causing

BB – brown bullhead cell line used in viral testing of aquatic animals.

BCS - bovine calf serum taken from newborn calves.

BHIA – brain-heart infusion agar, growth medium for culturing bacteria.

Blind passage - transfer of supernatant and inoculated tissue culture cells which are not demonstrating CPE to another culture plate containing fresh cells in order to: dilute out possible inhibitors of viral expression, and/or, to allow possible early viral replication due to low concentrations of virus particles to progress to detectable CPE.

Bothriocephalus acheilognathi – Asian tapeworm parasite.

Certification/certified—meeting the agreed criteria for a program or regulatory standard.

Case report —the sum characteristics defining the diagnostic and/or inspection testing performed on a group of aquatic animals. Case report defines the disease status of a population for the purposes of a disease control program. Case histories will include disease history of the stock or facility, gross and/or laboratory findings during examination, and any control measures that were undertaken to prevent or control disease.

Catarrhal inflammation - inflammation of the mucus membranes

Causal factors—a set of key determinants that are necessary to be present for disease to occur within a host population.

CCV – Channel Catfish Virus.

Ceratomyxa shasta – parasite responsible for causing ceratomyxosis disease in salmonid fish species.

Chain of Custody – documentation of sample identification, tracking, and disposition during laboratory testing.

CHSE-214 – chinook salmon embryo cell line used in viral testing of aquatic animals.

Citrobacter freundii – an opportunistic bacterium causing general septicemia.

Control (of disease)—disease management strategy whereby efforts are made to reduce the frequency of a disease to biologically or economically justifiable levels.

Controls for Tissue Culture (used in viral testing)

Monolayer control - tissue culture cells grown in presence of tissue culture medium only, which have not been inoculated with a test sample that may contain virus, and demonstrate normal or un-inoculated wells within a cell sheet.

Negative control – Inoculation of a tissue culture with a diluent (MEM-0 or other culture media) that does not contain virus.

Proper viral testing will not produce CPE in monolayer or negative control wells.

Clinical – founded on actual observation and treatment of an individual animal (distinguished from data or facts obtained from other sources), *clinical signs* or *clinical diagnosis*.

Closed System - an incubation system for tissue culture, that sealed against the transfer of air, i.e., a tissue culture flask with sealed caps.

Common carp - *Cyprinus carpio*; common carp are the original species of fish from which koi were developed as a color/fancy variety/strain/breed

Confluent Monolayer (100%) - a single layer of tissue culture cells, in which the cells have filled in all the spaces between them, creating a monolayer in a tissue culture plate or other substrate.

Cost-benefit analysis—an economic process for evaluating the costs and benefits of an event or an activity; calculating the estimated cost-benefit ratio estimate for a program or regulatory standard. Cost-benefit analysis should be applied to each risk mitigation measure to select the most efficient means of reducing the hazard.

Cytopathic Effects (CPE) - changes in the morphology and metabolism of tissue culture cells, indicating cell death, due to suspected viral infection.

NWFHS Database (or Database) – National Wild Fish Health Survey Database, accessible by resource managers and the public, via the internet (<http://>)

Defective Interfering Particles (D.I. Particles or Auto-Interference) - defective or incomplete virus particles which cannot replicate but may prevent expression of the infectious virus by attaching to the tissue culture cell receptor sites thereby blocking infectious particles. This can be a problem at low dilutions of tissue or ovarian fluid, particularly with the North American strain of VHSV.

Disease—functional and/or anatomic abnormalities in a population or the body of an individual caused by any infectious, noninfectious, or environmental conditions. Clinical disease is detectable by one or more of a person's senses. Subclinical disease is detectable only by selected laboratory tests or diagnostic aids. The detection of a potential pathogen does not constitute the detection of disease; many pathogens can be present without causing functional and/or anatomic abnormalities.

Edema – a build up of fluids within tissues, either local or generalized; ascites is accumulation of fluid in the peritoneal cavity. May result from increased permeability of capillary walls; increased capillary pressure due to venous obstruction, lymphatic obstruction, disturbances in renal function, reduction of plasma proteins, fluid and electrolyte imbalance, or inflammatory conditions.

Edwardsiella ictaluri – bacterial agent responsible for causing enteric septicemia of catfish.

Edwardsiella tarda – bacterial agent responsible for causing enteric septicemia of catfish.

ELISA – enzyme-linked immunosorbent assay, an immunological assay that utilizes specific antibodies against a pathogen or analyte. ELISAs usually produce colorimetric changes in the test sample, when the target analyte is present, that can be measured and quantified.

EPC – *Epithelioma papillosum cyprinid* carp cell line used for virology testing.

Epidemiology—the quantitative and/or descriptive study of the frequency, distribution, and determinants of health and disease in populations (contrast with "pathogenesis").

Eradication—disease management strategy whereby efforts are made to eliminate the pathogen from a defined population or geographic region. Risk analysis and estimated cost-benefit ratio are often included in a disease management strategy that may, or may not, include eradication.

Exophthalmia (exophthalmous) – Abnormal protrusion of the eyeball, sometimes called popeye.

FAT – fluorescent antibody test (and DFAT, direct fluorescent antibody test).

FBS - fetal bovine serum taken from unborn calves in utero.

FHM – fat head minnow cell line used for viral testing.

Fish Health Centers (or Centers) – collectively, the nine U.S. Fish and Wildlife Service Fish Health Centers located throughout the country.

FITC - fluorescein isothiocyanate, a reagent which is used as an antibody label for the fluorescent antibody test.

FITC-conjugated (antibody) - describes the existence of a fluorescent label on an antibody used for the fluorescent antibody test.

Flavobacterium columnare – bacterial agent responsible for Columnaris disease.

Flavobacterium psychrophilum – bacterial agent responsible for Coldwater disease.

Fomite - an inanimate object such as a net, brush, or clothing, on which a pathogenic microorganism may be transmitted from one animal to another.

GIS – Geographical Information System, mapping system using spatial relationships and Global Positioning System (GPS) coordinates for longitude and latitude; generally used for defining geographical locations.

Hazard—elements or events that pose potential harm; biological or chemical agents with the potential to cause an adverse health effect.

Homologous virus (as used in the viral serum neutralization procedure) - the positive control virus of the same identity used to make the neutralizing antibody.

IED – Iodophore Egg Disinfection - use of iodophor solutions (polyvinylpyrrolidone iodine) for the surface disinfection of salmonid eggs. U.S. Fish and Wildlife Service (Service) Fish Health Policies (713 FW 2.9) directs that all salmonid eggs shipped from or received at Service facilities shall be disinfected in 50-100 mg/L iodine for 30 min during the water-hardening process.

IHN – Infectious Hematopoietic Necrosis Virus.

Incidence—a rate of disease describing the probability of a new disease case developing during a defined time interval. Crude true incidence (I) is calculated from the proportion of animals developing disease (D) during a defined time period (T) from the average population (N) at risk during that time period ($I = D/N/T$).

Intraperitoneal- intracoelomic, within the body cavity

Iodophore - iodophor solutions (polyvinylpyrrolidone iodine) used for the surface disinfection of salmonid eggs (see Iodophore Egg Disinfection – IED).

IPNV- Infectious Pancreatic Necrosis Virus.

ISAV – Infectious Salmon Anemia Virus.

KHV - Koi Herpesvirus, the name of the virus that causes Koi Herpesvirus disease

Koi - Strain/variety of common carp that has been bred for scale and color pattern as a pond/ornamental fish

K/S – Kidney-Spleen (sample tissue type)

Lethargy – Sluggishness, abnormal inactivity or listlessness.

LMBV – Largemouth Bass Virus.

Mesentery – commonly, the peritoneal fold that encircles the small intestine and connects it to the posterior abdominal wall; other abdominal organs, however, also have a mesentery.

Monoclonal Antibody (MAb) - antibody produced by tissue culture cell lines derived from the spleen lymphocytes of immunized mice that have been fused (hybridoma) with mouse myeloma tumor cells. Hybridoma cells are cloned to select specific populations of cells that produce a single type of antibody against one epitope or antigenic determinant site. Contrasts with Polyclonal antibody, which is a pool of antibodies that can detect multiple epitopes of the target analyte.

Morbidity: disease or sickness

Myxobolus cerebralis – parasite responsible for causing Whirling disease in salmonids.

Normal serum (as used in the viral serum neutralization procedure) - serum from the same species of animal in which the neutralizing antibody is produced, that is used as a control for nonspecific viral inhibition that may occur during testing.

Notifiable disease: A disease which must, by law, be reported to the proper federal (USDA-APHIS-Veterinary Services) and state (Dept. of Agriculture and Consumer Services, state veterinarian) when positively diagnosed

OF – Ovarian Fluid (also Coelomic Fluid) (sample tissue type)

OMV – *Oncorhynchus masou* Virus.

Open System - a system of incubating tissue culture cells that is open to the transfer of air, i.e., a plate. Requires a medium that is buffered against rising pH from air exchange. Common buffering systems are TRIS and HEPES.

Overlay - a medium used in the plaque assay that is placed over a virus-inoculated cell monolayer to prevent physical spreading of viral particles except by cell-to-cell release of infectious particles. The overlay contains a semisolid medium such as methylcellulose or gum tragacanth.

Pathogen—an infectious or noninfectious agent that is a potential contributing environmental factor to disease.

Pathogenesis—the mechanism and determinants of disease development in an individual or a population. These may or may not have an impact on the spread of disease within a population.

Peritoneum - The serous membrane that lines the walls of the abdominal cavity and folds inward to enclose the viscera.

Petechial —marked by the presence of petechial: small, or pin-point hemorrhagic areas on the skin, internal organs, or the mesentery. Petechial skin hemorrhage appears as bloody areas of the skin.

Plaque - a hole or focus of degenerate or dead tissue culture cells in the cell monolayer caused by viral replication. One discrete plaque is assumed to be caused by infection with one infectious particle or aggregate (called one plaque-forming unit = pfu).

Polyclonal Antibody - the entire population of antibodies produced in the sera of immunized animals that are directed against many epitopes on many of the antigenic molecules used for immunization. Most immunogens injected are whole cells or viruses that are composed of many different antigen molecules. Each antigen molecule may have more than one epitope. See "Monoclonal Antibody" also.

Prevalence—a proportion (P) indicating the number of cases of a disease (D) within a population (N) at a specific time ($P=D/N$). True prevalence is difficult to discern, as all animals in a population would have to be tested to determine this value accurately. Often Apparent Prevalence is what is reported as prevalence, and is a more appropriate term.

Prevention—disease management strategy designed to exclude disease from a population or a defined geographic area.

PCR – polymerase chain reaction; a highly specific molecular assay that is used to identify the presence of specific pieces of an organisms genes (DNA). PCR can duplicate small quantities of a pathogens DNA, and by increasing this amount of DNA, the pathogen can be detected (+/-) using gel electrophoresis

QPCR – Quantitative PCR works similarly to standard PCR, but allows quantification of the DNA so researchers are better able to assess the severity of

an infection or disease. QPCR utilizes specialized instruments and quantitative algorithms to measure the quantity of DNA originally present in a test sample.

PRI – pathogen of regional interest, confined to a geographical area in the United States, or specific species of fish. Several fish pathogens targeted by the National Wild Fish Health Survey are of regional interest only.

Re-inoculation - transfer of inoculated tissue culture cells and supernatant from one plate to another that contains fresh cells. Used for suspected positive cultures to confirm presence of viral CPE as opposed to toxicity or contamination. Also used to replicate more viruses for storage, etc.

Renibacterium salmoninarum – bacterial agent responsible for bacterial kidney disease, a serious chronic disease of salmonids, that compromises kidney function and the ability to osmoregulate in saline environments.

Reportable disease - A disease which must be reported during aquatic animal health inspections to local authorities and under the USFWS Fish Health Policy.

Risk—the likelihood and magnitude of the outcome of the unwanted event; a function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard exposure.

Risk analysis—the process that includes risk assessment, risk management, and risk communication. See risk assessment.

Risk assessment—a scientifically based process for which answers to three questions are sought: (1) what can go wrong (hazard identification); (2) how likely is the hazard to occur; and (3) what is the severity of the effect if it does.

Risk-benefit analysis—a comparison of risks to the benefits inherent in the act being considered. A risk-benefit analysis is broader than a cost-benefit analysis.

Risk communication—the interactive exchange of information and opinions concerning risk among risk assessors, risk managers, customers, and other interested parties.

Risk characterization—a synthesis and summary of information about a potentially hazardous situation that addresses the needs of decision makers and interested and affected parties. It describes the larger context in which the hazard occurs. Are other hazards incurred by the mitigation proposed? What is the magnitude of the new hazards? Are there social or economic effects not reflected in the risk assessment or cost-benefit analysis? Who is affected by the hazard(s), by the mitigation(s)?

Risk management—the process of weighing policy alternatives in the light of the results of risk assessment and, if required, selecting and implementing appropriate control options, including regulatory measures.

Risk mitigation—the alternatives developed from the risk assessment to reduce the effects of the hazard being evaluated.

Self-limiting disease: does not cause major disease, and usually heals or resolves on its own.

Sensitivity (Test)—the probability that a diagnostic test for a particular disease or pathogen will detect a true positive when it is present. This is distinct from the general use of the term to indicate a threshold of detection.

Septicemia: a bacterial infection that spreads and travels through the blood to other organs

Serum neutralization - antibody molecules in the antiserum neutralize or block the antigenic receptor sites or otherwise degrade the protein coat (capsid) on the corresponding virus (antigen). This prevents virus attachment to and subsequent penetration of host tissue culture cells or virus replication once inside the cell. Neutralization of viruses by antibodies is specific and used to confirm viral identity. Neutralization may be reversible.

Service – U.S. Fish and Wildlife Service (also USFWS, or FWS). A federal agency, that actively partners with state and local authorities, to protect fish and wildlife species throughout the United States. USFWS administers the Endangered Species Act (ESA) for freshwater aquatic species, and terrestrial species, through protection of key habitats and coordinated environmental conservation.

Subculture - transfer of inoculated tissue culture cells and supernatant from one plate to another that contains fresh cells. Used for suspected positive cultures to confirm presence of viral CPE as opposed to toxicity or contamination. Also used to replicate or amplify viral titer for further study or cryopreservation (storage), etc.

Survey – National Wild Fish Health Survey (or NWFHS). A national initiative to study the prevalence and distribution of fish pathogens in natural fish populations in the United States.

SVCV: Spring Viremia of Carp Virus, a virus that infects carp species such as common carp including ornamental koi.

TCID₅₀ - denotes fifty percent tissue culture infective dose. This is the reciprocal of the highest dilution of virus that causes CPE in 50% of the wells inoculated with that dilution of infectious materials. This is determined by the Reed and Muench (1938) method.

Tissue Culture-Grade Water - High quality water (low in ions, minerals and contaminants) that must be used in preparation of all tissue culture media and reagents and in rinsing glassware to avoid toxicity to the cells. De-ionization at a resistance of, or greater than 18 mOhms achieves this level of water quality.

Titer - the number of infectious units or plaque-forming units (pfu) per unit of sample, i.e., per gram or mL.

Toxicity - changes in cell morphology or metabolism caused by toxic substances in the medium or inoculum. This can either cause cell death or interfere with cell metabolism, thereby reducing or preventing replication of the virus. These effects may have arisen through sample toxicity, bacterial or fungal contamination, improper glassware cleaning or improper media preparation. Usually toxicity can be distinguished from viral CPE by: how rapidly it occurs (1 day), abnormal cell appearance without cell death, and absence of the typical pattern of CPE for the test virus. In the case of toxicity due to contamination, turbidity of the medium or visible contaminant colonies can be observed.

NOTE: Inoculation of very high-titer suspensions of certain viruses can cause an apparent toxic effect within 24 hours. If there is any doubt to whether disruption of the cell layer was caused by toxicity or CPE, a subculture should be made. This is especially true for some inocula that can produce toxic effects that may take 5-7 days to develop.

Triturating - The act of dispersing tissue culture cells during subculture or preparation of test plates. Cells are drawn up into a pipet and repeatedly expelled back into the flask medium, or against the flask wall, to break up larger clumps of cells. Breaking up cell clumps promotes even growth of cells on subculture and/or formation of monolayers on test plates used for virology.

Trypsin - a proteolytic enzyme used to disperse cells and cause their release from the culture surface. After cells are released, serum proteins in fresh medium neutralize the enzyme and cells can subsequently adhere to culture surfaces. The proteolytic enzyme activity of Trypsin is slowed by low temperature, or extended storage. Trypsin is a widely used enzyme and causes cell release more readily than versene.

USGS – United State Geological Survey.

Versene (EDTA) - ethylene di-amine tetra-acetic acid is a chelating agent that binds divalent cations active in forming cell cement (hyaluronic acid) causing cells to round and release from the culture surface. See Trypsin also

Vertical transmission: spread of a disease from parents to offspring, through eggs or sperm

Viscera – Internal organs enclosed within a body cavity, especially the abdominal organs.

VHSV- Viral Hemorrhagic Septicemia Virus

WF – Whole fish (sample tissue type)

WV – Whole Viscera (sample tissue type)

WSHV2 – White Sturgeon Herpesvirus 2.

WSIV – White Sturgeon Iridovirus.

Yersinia ruckeri– bacterial agent responsible for causing Enteric Redmouth disease.

Zoonotic - Term used to describe a disease of animals (e.g., fish) that can be spread to, and cause disease in humans.