

**PSITTACID HERPESVIRUS 1/PACHECO'S DISEASE**

Animal Group(s) Affected	Transmission	Clinical Signs	Severity	Treatment	Prevention and Control	Zoonotic
Psittacines, rarely passerines	Ingestion of contaminated material from oral secretions or feces.  Aerosol route is possible but not proven.	Death with few premonitory signs.  Rarely nonspecific signs, including lethargy and the presence of bile pigments in urine.  Three of four PcHV-1 genotypes have been associated with oral and cloacal mucosal papillomas.	Dependent on viral genotype and species of birds, death can range from single birds to flock majority.  Virtually all birds showing signs of the acute form will die unless treated.  Mucosal papillomas cause considerable morbidity but are rarely fatal.	Acyclovir is very effective at stopping outbreaks when the entire flock is treated.	Closed flocks, isolating or culling subclinical carriers, and testing new arrivals at quarantine may assist in disease prevention.	No

**Fact Sheet compiled by:** Nadia Stegeman

**Sheet completed on:** 3 August 2011; updated 20 March 2013

**Fact Sheet Reviewed by:** David N. Phalen; Lauren V. Powers

**Susceptible animal groups:** Psittacines; and less commonly passerines although it has been reported in birds such as finches, canaries, and barbets (family Lybiidae).

**Causative organism:** Psittacid herpesvirus 1 (PsHV-1), formerly "Pacheco's disease (PD) virus", has 4 genotypes corresponding to 3 serotypes, and is an alphaherpesvirus. The pathogenicity of genotype varies significantly although all four genotypes have been shown to cause PD. Recently, in African grey parrots, psittacid herpesvirus 2 (PsHV-2) was identified from cloacal mucosa.

**Zoonotic potential:** None reported.

**Distribution:** Presumably worldwide due to bird trade, but it is most prevalent in densely populated captive psittacine collections. Case reports have documented confirmed disease in North America, Europe, Africa, Australia/New Zealand, the Middle East and Asia. A recent study suggests a 7% prevalence of PsHV-1 infection in the general US population of parrots. It is suspected that these viruses have evolved with Central and South American parrots.

**Incubation period:** Experimentally, 5-10 days to establish infection. Papillomas develop within a year of infection.

**Clinical signs:**

Acute: Death with no premonitory signs, aside from possible depression, anorexia, diarrhea, and yellow urates (biliverdinuria). In antemortem clinical chemistries, marked AST elevation can be found.

Chronic: Oral/cloacal papillomas that produce tenesmus and can be associated with frank blood from the

## PSITTACID HERPESVIRUS 1/PACHECO'S DISEASE

cloaca. In extreme cases, and when bile duct and pancreatic duct carcinomas develop, chronic wasting can occur.

### **Post mortem, gross, or histologic findings:**

Due to rapid death, acutely affected birds may show no gross lesions. However, when abnormalities are present, they may be in the liver, spleen, kidneys and intestines. Histopathological findings include multi-organ (e.g., spleen, intestines, pancreas, trachea, air sacs) necrotizing lesions, hemorrhage and congestion of the liver, spleen, and kidneys and hepatomegaly or splenomegaly may be seen. Intranuclear inclusion bodies (Cowdry Type A) are most common in the liver, but have been demonstrated in the kidneys, spleen, pancreas and small intestines.

In the chronic form of the disease, mucosal papillomas may be seen, most commonly in the oral and cloacal mucosa or upper gastrointestinal tract. These lesions are found in the disease complex termed internal papillomatosis of parrots (IPP). A high prevalence of carcinomas in the bile duct and pancreatic duct has been observed in aviaries where IPP had been noted in birds infected with PcHV-1 genotype 3. These tumors can be, but not always, detected with coelomic ultrasound and are associated with a rise in serum GGT. Many ventricular and cloacal carcinomas appear to be caused by PsHVs. Cloacal carcinomas have a grave prognosis due to the reportedly high metastatic rate. One case report discusses chronic active pancreatitis (with diabetes mellitus, weight loss, PU/PD, glucosuria, and hyperglycemia) associated with PsHV-1 infection in a cockatiel (*Nymphicus hollandicus*).

### **Diagnosis:**

Inapparently infected birds: Gross identification of mucosal papillomas. PCR or real-time PCR on cloacal, oral mucosal swabs and whole blood. It is important to note that the virus is shed intermittently, leading to the possibility of false negative results by PCR. However, the majority of birds remain PCR positive at all time; the sensitivity of mucosal swabs is higher than that of whole blood. Serology has practical merit.

Birds that are serologically positive are likely latently infected.

Post-mortem specimens: Characteristic histologic findings, electron microscopy, cell culture, immunofluorescent antibody staining and PCR.

**Material required for laboratory analysis:** It is important to note that the virus is shed intermittently, leading to the possibility of false negatives. However, the majority of birds remain PCR positive at all times. The sensitivity of mucosal swabs is higher than that of whole blood.

Pacheco's Disease: Whole blood, tissues (frozen liver/spleen or swabs), frozen liver/spleen for culture, choanal/cloacal swabs, histopathology of liver, spleen, pancreas, intestine, crop

Subclinically infected birds: Choanal/cloaca swabs, serum, whole blood

### **Relevant diagnostic laboratories:**

Veterinary Molecular Diagnostics

5989 Meijer Dr. Suite 5

Milford, Ohio 45150

513-576-1808

(PCR based DNA probe; can detect all PsHV-1 variants)

**Treatment:** Acyclovir (80-100mg/kg three times a day for 10 days; Zovivax, GlaxoSmithKline) has been shown to reduce the sickness and death of PsHV-1 affected birds and generally, after a few days of treatment, all deaths cease. Acyclovir has been associated with kidney damage in some species but this problem is uncommon or rare.

Mucosal papillomas typically wax and wane and only require surgical intervention in extreme cases.

Surgical resection of papillomas is a palliative treatment.

**Prevention and control:** Screening and isolation of infected individuals is critical. PCR positive birds

**PSITTACID HERPESVIRUS 1/PACHECO'S DISEASE**

should be housed separately from other parrots. Macaws, conures and Amazon parrots and should be carefully examined prior to acquisition. That being said, not all PcHV-1 genotypes are serologically cross reactive, meaning that infection with one variant of the virus does not protect from infection from another. Control methods in the midst of an outbreak are debated. While some support catching and moving individual birds, others advocate minimal disturbances until the outbreak is over. Immediate treatment of exposed birds with acyclovir at 1mg/ml drinking water and 400mg/kg of soft mash) is indicated. Gavage feeding at 70-100mg/kg BID has also been suggested.

Commercial monovalent vaccine (killed virus) for PsHV-1 is derived from a single, unreported serotype. It is not known how much protection this vaccination provides against variants other than genotype 1. Complications from vaccine include injection granulomas and acute death. Cockatoos appear to be overrepresented in populations experiencing complications. Additionally the product, Psittimmune PDV (Biomune in Lenexa, Kansas) no longer appears available. One case report suggests autogenous, formalin-inactivated vaccine with aluminum hydroxide gel adjuvant may stop virus spread, decreasing morbidity and mortality.

Individuals with this disease can continue to be used as breeders. However, all eggs must be artificially incubated and hand-raised until vertical transmission impacts are better established.

**Suggested disinfectant for housing facilities:** As PsHV-1 is an enveloped virus, it is readily inactivated by commonly used disinfectants. EPA approved disinfectant (virucidal, fungicidal, bacteriocidal) or sodium hypochlorite (bleach) solution (800ppm) is effective for most herpesviruses. It can also be inactivated by heating to 56°C for 10 minutes or by exposing it to pH <5.

**Notification:** None required, although notification to institutions that received birds previously exposed to chronic shedders is recommended.

**Measures required under the Animal Disease Surveillance Plan:** Currently none.

**Measures required for introducing animals to infected animal:** Not recommended.

**Conditions for restoring disease-free status after an outbreak:** Isolating infected and exposed individuals, testing exposed individuals after clinical signs in the aviary subside.

**Experts who may be consulted:**

David N. Phalen, DVM, PhD, DABVP (Avian)  
 Director Wildlife Health and Conservation Center, University of Sydney  
 Sydney, NSW  
 david.phalen@sydney.edu.au

**References:**

1. Herpesviridae. 1995. *In*: Ritchie, B.W. Avian Viruses: Function and Control. Wingers Publishing, Lake Worth, Florida. Pp. 171-222.
2. Katoh, H., H. Ogawa, K. Ohya, and H. Fukushi. 2010. A review of DNA viral infections in psittacine birds. *J. Vet. Med. Sci.* 72(9): 1099-1106.
3. Phalen, D., M. Falcon, and E. Tomaszewski. 2007. Endocrine pancreatic insufficiency secondary to chronic herpesvirus pancreatitis in a cockatiel (*Nymphicus hollandicus*). *J. Av. Med. Surg.* 21(2): 140-145.
4. Phalen D., E. Tomaszewski, and D. Styles. 2009. Epizootiology, diversity and pathogenicity of Psittacid Herpesviruses. *Proc. Annu. Conf. Assoc. Av. Vet. Milwaukee, Wisconsin*: 47-51.
5. Phalen, D., and R. Woods. 2009. Psittacid Herpesviruses and mucosal papillomas of psittacine birds in Australia: Fact Sheet. Australian Wildlife Health Network.  
[http://www.wildlifehealth.org.au/Portals/0/Documents/FactSheets/Herpesviruses%20\(Psittacine\)%200Aug%202009%20\(2.2\).pdf](http://www.wildlifehealth.org.au/Portals/0/Documents/FactSheets/Herpesviruses%20(Psittacine)%200Aug%202009%20(2.2).pdf). Accessed 13 August 2013.
6. Phalen, D.N. 2006. Psittacid herpesviruses. *In*: Harrison, G.J. and T. Lightfoot (eds.). *Clinical*

**PSITTACID HERPESVIRUS 1/PACHECO'S DISEASE**

Avian Medicine. Vol. II. Spix Publishing, Inc., Palm Beach, Florida. Pp. 732-734.

7. Styles, D. K., E.K. Tomaszewski, and D.N. Phalen. 2005. A novel psittacid herpesvirus found in African grey parrots (*Psittacus erithacus erithacus*). *Avian Pathol.* 34: 150–154.
8. Tomaszewski, E.K., W. Wagle, and D.N. Phalen. 2006. Tissue distribution of psittacid herpesviruses in latently infected parrots, repeated sampling of latently infected parrots and prevalence of latency in parrots submitted for necropsy. *J. Vet. Diagn. Invest.* 18: 536–544.
9. Tomaszewski, E.K., M. Gravendyck, E.F. Kaleta, and D.N. Phalen. 2004. Genetic characterization of a herpesvirus isolate from a superb starling (*Lamprotornis superbus*) as a psittacid herpesvirus genotype 1. *Avian Dis.* 48(1): 212-214.
10. Tomaszewski, E.K., E.F. Kaleta, and D.N. Phalen. 2003. Molecular phylogeny of the psittacid herpesvirus causing Pacheco's disease: correlation of genotype with phenotypic expression. *J. Virol.* 77: 11260–11267.