

CHLAMYDIOSIS (Psittacosis, ornithosis)

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Birds Amphibians Reptiles Mammals People	Aerogenous by secretions and excretions, Dust of feathers and faeces, Oral, Direct horizontal, Vertical, By parasites (but not on the surface)	Very species dependent: Anorexia Apathy Dispnoe Diarrhoea Cachexy Conjunctivitis Rhinorrhoea Nervous symptoms Reduced hatching rates Increased newborn mortality	Especially the <i>Chlamydophila psittaci</i> is ZONOSIS. Other strains relative host specific. Yes: especially in young animals and animals, which are damaged in any kind. However, many animals are carrier without clinical symptoms.	Antibiotics, especially tetracycline and doxycycline. For substitution electrolytes at persisting diarrhoea.	Depending on strain. <i>In houses</i> Maximum of hygiene in keeping and feeding. <i>in zoos</i> avoid stress, quarantine, blood screening, serology, take swabs (throat, cloaca, conjunctiva), IFT, PCR.

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Susceptible animal groups In case of <i>Chlamydophila psittaci</i> : birds of every age; up to now proved in 376 species of birds of 29 orders, including 133 species of parrots; probably all of the about 9000 species of birds are susceptible for the infection; for the outbreak of the disease, additional factors are necessary; very often latent infection in captive as well as free-living birds. Other susceptible groups are amphibians, reptiles, many domestic and wild mammals as well as humans. The other <i>Chlamydia</i> sp. and <i>Chlamydophila</i> strains are species specific and not zoonotic.	
Causative organism Psittacosis is caused by the obligate intracellular living bacterium <i>Chlamydophila psittaci</i> (formerly <i>Chlamydia psittaci</i>). Because of new isolations and genetic differentiations the nomenclature of Chlamydiales undergoes continuous changes. At the moment the nomenclature is the following (Everett et al., 1999): <i>Chlamydia</i> is divided into two genera, <i>Chlamydia</i> and <i>Chlamydophila</i> gen. nov. The two new species <i>Chlamydia muridarum</i> sp. nov. and <i>Chlamydia suis</i> sp. nov. are joining <i>Chlamydia trachomatis</i> in the emended genus <i>Chlamydia</i> . <i>Chlamydophila</i> gen. nov. assimilates the current species <i>Chlamydia pecorum</i> , <i>Chlamydia pneumoniae</i> , <i>Chlamydia psittaci</i> to form <i>Chlamydophila pecorum</i> comb. nov., <i>Chlamydophila pneumoniae</i> comb. nov. and <i>Chlamydophila psittaci</i> comb. nov. Three new <i>Chlamydophila</i> species are derived from <i>Chlamydia psittaci</i> : <i>Chlamydophila abortus</i> gen. nov., sp. nov., <i>Chlamydophila caviae</i> gen. nov., sp. nov. and <i>Chlamydophila felis</i> gen. nov., sp. nov. These families, genera and species are readily distinguished by analysis of signature sequences in the 16S and 23S ribosomal genes. By means of mononuclear antibodies six avian serovars were isolated, related to their origin, e. g. parrots, doves, ducks, turkeys.	
Zoonotic potential <i>Chlamydophila psittaci</i> causes chlamydiosis (psittacosis or ornithosis) as a zoonosis and is absolutely infectious for people of every age. Persons who are in contact with birds or mammals at home or in the	

wilderness could be at risk. Especially children, elderly and people with immunodeficiency might get sick. The clinical signs, like in birds, can vary from inapparent up to severe symptoms with lethal outcome; after an incubation period from 1-3 weeks there will be fever, unspecific pneumonias, limb aches and cardiovascular disorders. Overall, it lasts 2-7 weeks with 1 % lethal outcome.

Distribution

Animals: world-wide in birds, amphibians, reptiles, mammals (captive and free-living).

People: world-wide, but nowadays there are no endemic or epidemic situations in Europe any more for *C. psittaci*.

Transmission

Mostly aerogenous. Transmission occurs with all secretions and excretions (faeces, tears, nose secretions, crop milk, secretions of bill or throat). Oral transmission is possible but not relevant. A direct horizontal transmission parents-juvenile animals, a vertical transmission parents-egg-juvenile animals, and a transmission by parasites (chewing lice, mites) are possible too, but are not relevant either.

Transmission of "psittacosis" occurs from birds to birds or other animals, including man.

Transmission from other animals, incl. man, to other animals incl. birds is very rare and not really proven.

Incubation period

Chlamydophila psittaci isolates show various virulence or pathogenicity. Depending on the dose of infection and on the immunity, the disease can progress in different ways in birds, with various incubation periods. The incubation can last from 3-7 days up to 3 months (or carrier state).

Clinical symptoms

As the disease in birds shows great variability, very different clinical symptoms are observed. General symptoms, liver problems, respiratory, gastro-intestinal and central-nervous symptoms can be seen, depending on the type of disease progression.

Anorexia, apathy, dyspnea, yellow urates and diarrhoea are often present, but also depend on the organ system involved. Disorders of the central nervous system are occurring especially in chronic cases. Other acute or chronic diseases could modify the symptoms.

The most specific symptom in birds often is yellow urates as sign of liver involvement and a uni- or bilateral conjunctivitis and ophthalmo- and rhinorrhoea.

Post mortem findings in birds

Macroscopically: many versatile changes depending on the pathogenicity of the strain like rhinitis, conjunctivitis, sinusitis, aerosacculitis, pneumonia, pericarditis, myocarditis, hepatitis, nephritis, enteritis, orchitis, polyserositis and meningoencephalitis.

Histologically: foci of hyperplasia in lymphoreticular spleen tissues; increase of monocytes and of Kupffer-cells in the liver in the presence of necrosis; pneumonia with proliferation of epithelial cells; in conjunctivas there is infiltration with different cell types and macrophage-like cells with intracytoplasmic inclusions.

Diagnosis

Clinical and pathologic changes in the bird are not pathognomical for psittacosis. Therefore, the diagnosis can only be confirmed by direct identification of the agent or indirectly by means of serological tests. At the moment, especially IFT, antigen-capture-ELISA and PCR techniques are used for antigen detection in faeces, conjunctival-, throat- and sewer swabs in live animals; or organ impressions or histology at necropsy. The blocking-antibody-ELISA (BELISA) is used for blood specimens (serology). As a quick test, the aspecific staining as a modified Ziehl-Neelson (Machiovelli or Stamp stain) can be used.

Material required for laboratory analysis

Swabs of conjunctivae, nose, throat, and cloaca; blood samples (serum); whole body of diseased animals. Single or collected faeces specimens are less suitable, but if used, they should be as fresh as possible or kept at 4°C. For longer transport, use a transport medium (e. g. Na-phosphate-buffered NaCl-solution).

Relevant diagnostic laboratories

In Germany: all county-examination-institutions (Landesuntersuchungsanstalten); bird clinics of the veterinary faculties at the Universities of Gießen, Hannover, Munich, Leipzig, Berlin; private laboratories.

In the Netherlands: Dept Vet Pathology, Section Special Animals and Wildlife, Utrecht

In Switzerland: Institut für Veterinärbakteriologie der Univ. Zürich, Nationales Ref. und Untersuchungs-lab. für Geflügel- und Kaninchenseuchen, CH-8057 Zürich

Treatment

In Germany, treatment is given in a psittacosis-decree and accessory carrying out- and responsibility notes.

It is valid for all imported parrots and parakeets from EU- and third countries; it is decreed and controlled by the official veterinarians. In affected psittacine holdings, all birds of the holdings should be treated with Chlorotetracycline, Doxycycline or Enrofloxacin. The success of treatment has to be checked by sampling. Today, it is rarely necessary to kill the whole population. Similar strategy of treatment could be decreed and used in non-psittacines. At the moment, the therapy can only affect Chlamydiales with active metabolism and which are reproducing. Those which are lying latent in epithelial cells of the respiratory and digestive system

will not be affected by the therapy. There are no vaccines available at the moment. Work with a *Chlamydia psittaci*-MOMP-vaccine (major-outer-membrane-protein) produced by genetic engineering is on-going. Intranasal vaccination should interrupt the aerogenous mode of infection by developing mucous membrane antibodies.

The treatment for non-quarantine situations, birds or other infected animals, is doxycycline or enrofloxacin for 3-6 weeks.

Prevention and control in zoos

Highest standards of hygiene for husbandry and feeding; quarantine for new animals including diagnostic examinations; systematic examination for Chlamydiales in all psittacines by means of detection of the agent with triple swabs and rehabilitation of positive populations; presentation of negative tested birds only in the visitors areas.

Suggested disinfectant for housing facilities

First, rough and wet cleaning without any dust, then using disinfectants based on ethanol (kills the Chlamydiales within 30 minutes) or quaternary ammonium compounds. Phenol and formalin are less suitable. Efficient UV-lights kill Chlamydiales within 3 minutes.

In Germany, pay attention to the instructions about animal keeping from September 2000 in the 11th DVG-list. There is a test-protocol for the preparation "Venno Vet 1" with very good results.

Notification

In Germany, the Netherlands, and many other European countries, there is a duty of notification for chlamydiosis in psittacines and of information for chlamydiosis in non-psittacines or psittacosis of people. Psittacosis is registered as an occupational disease according to the occup. disease decree in Germany.

Guarantees required under EU Legislation

There is an urgent need of a standardized EU-legislation for chlamydia infections. The development of a vaccine, based on genetic engineering, should be supported.

In Germany an authorization for transfer of psittacines from other EU-countries and for import from third countries is necessary, including quarantine and treatment of the birds, fixed at the "Binnenmarktterseuchenschutzverordnung" (home market-animal epidemic-protection decree).

Guarantees required by EAZA Zoos

Trade only with psittacines who are tested negative for Chlamydia.

Measures required under the Animal Disease Surveillance Plan

Creation of populations of psittacines free of Chlamydiales in zoos, analogous to the procedure in the Netherlands; trade and exhibitions only with Chlamydia free psittacines; autopsy of all birds who dies in zoos, with certification about a free population.

Measures required for introducing animals from non-approved sources

Quarantine; diagnostic examination by means of triple swab of conjunctiva, throat, sewer, possibly blood; examination for notifiable diseases and for other highly pathogenic agents in birds.

Measures to be taken in case of disease outbreak or positive laboratory findings

Place holding under prohibition; measures by decree of the veterinary office; Enrofloxacin (Baytril) 500 ppm through medicinal food or water, or injection of 10 mg/kg bodymass SID during 14 days or Vibravenous®, 75-100 mg/kg bm once a week for 6 weeks; triple swab from conjunctiva, throat, and cloaca after the end of the therapy; by failure, possibly repetition of the treatment; continuous measures of disinfection.

Conditions for restoring disease-free status after an outbreak

See previous point. In Germany, a population is certificated as free by the veterinary office according to the psittacosis-decree.

Contacts for further information

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- Bird clinics at the Universities of Gießen, Hannover, Munich, Leipzig and Berlin, Germany
- In the U.S.A., a „Compendium of Chlamydiosis (Psittacosis) Control“ exists, which is annually updated by the NASPHV-Committee; it is a guideline for the management of chlamydiosis in birds, which is compiled by the American Veterinary Medical Association (AVMA), Council of State and Territorial Epidemiologists (CSTE) and the Association of Avian Veterinarians (AAV) together.

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