

NEWCASTLE DISEASE

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Possibly all avian species, mainly: Galliformes, passeriformes, columbidae, Phalacrocoriidae, psittacines, birds of prey, waterfowl less susceptible	Direct, horizontal: inhalation or ingestion. Vertical transmission controversial	Sudden death, respiratory, enteric, and / or nervous signs	Dependent on different factors: Species and individual susceptibility, virulence of the infecting NDV, etc. Can cause outbreaks with very high mortality, unapparent infection and varying degrees of affection. Definition of virulent strains (e.g. vvNDV) based on susceptible domestic chicken, not directly transferable to other species	No treatment available. Supportive treatment (parenteral fluids, force feeding, etc.), injection of hyperimmune serum	<i>In houses</i> Quarantine of newly acquired birds, vaccination* <i>in zoos</i> quarantine up to 60 days for risk birds, vaccination, isolation or euthanasia of affected birds, disinfection *(OIE does not recommend vaccination of "exotic (= not domestic poultry) birds")

Fact sheet compiled by Ursula Höfle, DVM, PhD	Last update December 2002
Fact sheet reviewed by Prof. E. F. Kaleta, Thijs Kuiken, DVM, PhD	
Susceptible animal groups Birds, at least 27 of the 50 existing orders have been described to develop ND. Severe outbreaks in rock doves (Europe, 1980s), double crested cormorants (USA and Canada, 1990s), as well as psittacines and tropical birds in captivity.	
Causative organism Avian Paramyxovirus 1 (aPMV-1) or Newcastle Disease Virus (NDV), family <i>Paramyxoviridae</i> . Single stranded RNA virus. Complex of different strains of varying virulence.	
Zoonotic potential Existent, but low. Symptoms include mild to severe conjunctivitis, general malaise and sinusitis that resolve after seven to twenty days.	
Distribution Practically world-wide. Widespread in Asia, Africa, North and South America. Less in Europe and Australia. Real distribution in domestic poultry masked by routine vaccination. Knowledge on distribution of different aPMV-1 strains among wild birds is incomplete and difficult to obtain due to natural migration and translocation of exotic pet birds.	
Transmission Horizontal transmission via inhalation or ingestion, vertical transmission controversial.	
Incubation period Average 5 to 6 days, variation from 2 to 15 days, possibly species specific, but also dependent on the bird species, infecting virus strain, immune status, age and condition of the host.	
Clinical (symptoms) signs Dependent on affected host species and virulence of the infecting virus strain. Infection can be inapparent or	



lead to mild or severe, fatal disease. Clinical signs include sudden death, listlessness, facial oedema, respiratory signs, nervous signs (uncoordinated gait, drooping wings, leg paralysis, muscle tremors, twisting (opisthotonus) of head and neck "star gazing" up to total paralysis), green diarrhoea in birds that survive early infection. Respiratory and nervous signs may appear at the same time, or the former may precede the latter. Virus strains are grouped into pathotypes (neurotropic velogenic, mesogenic, lentogenic, and apathogenic) based upon clinical signs in the susceptible domestic chicken, but the symptoms produced by specific strains in different host species vary considerably, thus, this classification cannot be applied to other species. In wild birds, e.g. in the epizootics among rock doves and double-crested cormorants nervous signs seem to be predominant.

Post mortem findings

Mostly, no pathognomic gross lesions exist, and gross lesions may be completely absent. Also, lesions depend on pathogenicity of the strain for the species. If lesions exist they affect one or various of four different systems: central nervous and respiratory system, alimentary tract and kidney. Haemorrhagic lesions may appear in the proventriculus, caeca and small intestine, especially in galliform birds infected by very virulent strains. In wild birds lesions may be restricted mainly to the central nervous system and the kidney and only be evident microscopically. Histopathologic lesions are also variable and can include: nonpurulent encephalomyelitis, hyperaemia, oedema and haemorrhage in blood vessels, haemorrhagic-necrotic lesions in the digestive tract, inflammatory reactions in the upper respiratory tract and oedema, hyperaemia and haemorrhage in the lung. In rock doves and cormorants lesions in the central nervous system consisted of non-suppurative inflammation in the brain and cord, with lymphocyte cuffs around blood vessels and associated gliosis, necrosis of neurons and swelling of endothelial cells. These lesions appeared mainly in the brain stem and cerebellum and on occasions included the meninges. In the kidney, nonsuppurative nephritis consisting of multiple small areas of infiltration of the renal parenchyma with lymphocytes and plasma cells have been found in these species. The infiltrations were associated with small foci of necrosis of renal tubule cells. Focal nonsuppurative pancreatitis has been noted in infected Rock Doves.

Diagnosis

Virus isolation in cell cultures (chicken embryo fibroblast CEF- cultures or chicken embryo liver CELC- cultures) or embryonated eggs. Also RT-PCR and posterior sequencing of nucleotides to determine the pathotype. Immunohistochemistry on paraffine embedded tissue sections. Detection and quantification of antibodies to Newcastle disease virus by Haemagglutination inhibition (HI) test or ELISA.

Material required for laboratory analysis

Material from intestinal and respiratory tract: Cloacal and tracheal swabs, intestinal contents or faeces, trachea. Also, organ material that reflects the clinical symptoms prior to death, for example lung, kidney, intestine (including contents), spleen, brain, liver and heart.

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Treatment

No treatment available. Supportive treatment (parental fluids, force feeding) may be sufficient to maintain the animal alive until it recovers, also injection of hyperimmune serum has proven to be effective in some species.

Prevention and control in zoos

Prevention of contact between species from geographically distinct areas, and preferably in situ programs if re-introduction is intended. Serological screening and quarantine of at least thirty days, in species at high risk of Newcastle disease sixty days. The OIE does not recommend vaccination in avian species that are not domestic poultry (exotic avian species).

Suggested disinfectant for housing facilities

Peroxiacetic acid, formaldehyde organic acids, chlorine

Notification

Classified as an OIE list A disease. Obligatory notification (EU): Any infection with virus having an ICPI (intracerebral pathogenicity index) of 0,7 or greater, or in which multiple basic amino acids have been demonstrated in the virus at the C-terminus of the F2 protein and phenylalanine at residue 117 which is the N-terminus of the F1 protein, has to be reported as an ND outbreak (domestic poultry).

Guarantees required under EU Legislation

(The Council Directive 92/66/EEC regulates measures in domestic poultry but does not include control measures as regards Newcastle disease in wild birds kept in captivity or free living birds. The lack of scientific knowledge as regards the role of wildlife in the epidemiology of Newcastle disease has so far made it impossible to establish precise rules at Community level. Therefore, it is up to the Member States to study the local epidemiological situation and to decide which measures could be successfully applied.) Deduced from the official Journal of the European Community 29-08-02.

Council Directive 92/65/EEC:

(Birds have to) „come from a holding or an area not subject to restrictions under measures to be applied to combat Newcastle Disease“

- if coming from a third country have been quarantined in the institution to which they were taken after entering the territory of the EEC
- have to be accompanied by a health certificate „commercial document“ for intracommunity trade issued and signed by a qualified veterinarian (either official, or the veterinarian responsible for the institution and empowered for this purpose by the authorities.

OIE (International Animal Health Code):

When importing (wild birds) from a Newcastle disease free country:

International veterinary certificate that attests that the birds

- a) Showed no clinical signs of ND on the day of shipment
- b) Come from an ND free country
- c) Were kept in quarantine since they were hatched or for at least 21 days prior to shipment

Guarantees required by EAZA Zoos**Measures required under the Animal Disease Surveillance Plan**

Poultry requires a certificate that shows that, to the best of the knowledge and belief of a veterinarian, the poultry and flock of origin are free from Newcastle disease and have not been exposed to avian pneumoencephalitis (Newcastle disease).

Birds must be free from Newcastle disease, and come from a Newcastle disease free zone /country. Pigeons must have been vaccinated not earlier than 30 and not longer than 180 days before import with a killed



vaccine.

Measures required for introducing animals from non-approved sources

OIE (International Animal Health Code):

Veterinary Administrations of ND free countries may prohibit importation or transit through their territory, from countries considered infected with ND of the following commodities:

- 1) domestic and wild bird
- 2) day-old birds
- 3) Hatching eggs
- 4) Semen of domestic and wild birds
- 5) Fresh meat of domestic and wild birds
- 6) Meat products of wild and domestic birds (if there has been no treatment to destroy ND-virus)
- 7) Products of animal origin (from birds) intended for use in animal feeding or for agricultural or industrial use

When importing (wild birds) from a country considered infected with ND:

An International veterinary certificate that attests that the birds

- a) Showed no clinical signs of ND on the day of shipment
- b) Were kept in quarantine since they were hatched or for at least 21 days prior to shipment is required.

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

Dependent on country measures for poultry include (OIE):

- a) Application of a stamping-out policy with compulsory slaughter of affected birds, elimination of their products and contacts and posterior disinfection procedures as well as restrictions for movement and marketing of birds within a defined quarantine area or zone

In exotic birds strict isolation of outbreaks and thorough cleaning and disinfection of premises should be observed.

Conditions for restoring disease-free status after an outbreak

In domestic poultry (OIE):

a) for a country

- Proven absence of ND for at least the past three years.
- Absence of ND for at least 6 months after slaughter of the last affected animal in countries where a stamping-out policy with or without vaccination is applied.

b) for a zone

- That at least 21 days have passed since the confirmation of the last case and the completion of a stamping-out policy and disinfection procedures if these were applied, or
- That at least 6 months have passed, after the clinical recovery or death of the last affected bird, if a stamping-out policy was not applied.

Contacts for further information

OIE Animal Health Code, 10th edition, 2002; europa.eu.int (eur-lex) for EEC legislation

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