

Newcastle disease

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Newcastle disease virus

Virus classification

Group: Group V (*(-)ssRNA*)

Order: *Mononegavirales*

Family: *Paramyxoviridae*

Genus: *Avulavirus*

Species: *Newcastle disease virus*

Newcastle disease is a contagious [bird disease](#) affecting many domestic and wild avian species. Its effects are most notable in domestic [poultry](#) due to their high susceptibility and the potential for severe impacts of an [epidemic](#) on the poultry industries. It is [endemic](#) to many countries.

Newcastle Disease was discovered in [Newcastle upon Tyne](#), England in 1926 (Doyle), but also at this time slightly different strains were found in other parts of the world.

Exposure of humans to infected birds (for example in poultry processing plants) can cause mild [conjunctivitis](#) and [influenza](#)-like symptoms, but the Newcastle disease virus (NDV) otherwise poses no hazard to human health. Interest in the use of NDV as an anticancer agent has arisen from the ability of NDV to selectively kill human [tumour](#) cells with limited toxicity to normal cells.

No treatment for NDV exists, but the use of prophylactic vaccines and sanitary measures reduces the likelihood of outbreaks.

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[\[edit\]](#) The causal agent

[\[edit\]](#) Description

The causal agent, *Newcastle disease virus* (NDV), is a negative-sense single-stranded [RNA virus](#). Transmission occurs by exposure to faecal and other excretions from infected birds, and through contact with contaminated feed, water, equipment and clothing.

[\[edit\]](#) Strains

NDV strains can be categorised as velogenic (highly [virulent](#)), mesogenic (intermediate virulence) or lentogenic (nonvirulent). Velogenic strains produce severe nervous and respiratory signs, spread rapidly and cause up to 90% mortality. Mesogenic strains cause coughing, affect egg quality and production and result in up to 10% mortality. Lentogenic strains produce mild signs with negligible mortality.

[\[edit\]](#) Use as an anti-cancer agent

In 1999, promising results were reported using an attenuated strain of the Newcastle virus codenamed MTH-68 in cancer patients^[1] by researchers who had isolated the strain in 1968^{[2][3]}. It appears that the virus preferentially targets and replicates in certain types of tumor cells, leaving normal cells almost unaffected. In 2006 researchers from the [Hebrew University](#) also succeeded in isolating a variant of the Newcastle Disease Virus codenamed NDV-HUJ which showed promising results in 14 [Glioblastoma multiforme](#) patients^[4].

[\[edit\]](#) Use as a biological weapon

Newcastle disease was one of more than a dozen agents that the United States researched as potential [biological weapons](#) before the nation suspended its biological weapons program^[citation needed].

[\[edit\]](#) Transmission

NDV is spread primarily through direct contact between healthy birds and the bodily discharges of infected birds. The disease is transmitted through infected birds' droppings and secretions from the nose, mouth, and eyes. NDV spreads rapidly among birds kept in confinement, such as commercially raised chickens.


High concentrations of the NDV are found in birds' bodily discharges; therefore, the disease can be spread easily by mechanical means. Virus-bearing material can be picked up on shoes and clothing and carried from an infected flock to a healthy one.

NDV can survive for several weeks in a warm and humid environment on birds' feathers, manure, and other materials. It can survive indefinitely in frozen material. However, the virus is destroyed rapidly by dehydration and by the ultraviolet rays in sunlight. Smuggled pet birds, especially Amazon parrots from Latin America, pose a great risk of introducing NDV into the US. Amazon parrots that are carriers of the disease but do not show symptoms are capable of shedding NDV for more than 400 days.

[\[edit\]](#) Clinical findings

[\[edit\]](#) Symptoms



 Egg drop after a (otherwise asymptomatic) Newcastle disease infection in a duly vaccinated broiler parent flock

Signs of infection with NDV vary greatly depending on factors such as the [strain](#) of virus and the health, age and species of the [host](#).

The incubation period for the disease ranges from 2 to 15 days. An infected bird may exhibit the following signs:

They can include respiratory signs (gasping, coughing), nervous signs (depression, inappetence, muscular tremors, drooping wings, twisting of head and neck, circling, complete paralysis), swelling of the tissues around the eyes and neck, greenish, watery diarrhoea, misshapen, rough- or thin-shelled eggs and reduced egg production.

In acute cases, the death is very sudden, and, in the beginning of the outbreak, the remaining birds do not seem to be sick. In flock with good immunity, however, the signs (respiratory and digestive) are mild and progressive, and are followed after 7 days by nervous symptoms, especially twisted heads.



[Torticollis](#) in a [mallard](#).



Same symptom in a broiler.



PM lesions on proventriculus, gizzard and duodenum.

[\[edit\]](#) **Post-mortem lesions**

Typical are the [petechiae](#) in [proventriculus](#) and on submucosae of [gizzard](#); there is also severe enteritis of the duodenum. The lesions are scarce in hyperacute cases (first day of outbreak).

[\[edit\]](#) **Diagnosis**

[\[edit\]](#) **Immunological tests**

Enzyme Linked Immunosorbant Assay (ELISA), PCR, Sequence technology.

[\[edit\]](#) **Virus isolation**

[\[edit\]](#) **Samples**

For routine isolation of NDV from chickens, turkeys, and other birds, samples are obtained by swabbing the trachea and the cloaca. Cotton swabs can be used. The virus can also be isolated from the lungs, brain spleen, liver, and kidneys.

[\[edit\]](#) **Handling**

Prior to shipping samples should be stored at 4 C. (refrigerator). Samples must be shipped in a padded envelope or box. Samples may be sent by regular mail, but overnight is recommended.^[5]

[\[edit\]](#) Prevention

Any animals that are showing symptoms of Newcastle Disease should be quarantined immediately. New birds should also be vaccinated before being introduced to your flock. There is an inactivated viral vaccine available, as well as various combination vaccines.

[\[edit\]](#) References

- Nelson CB, Pomeroy BS, Schrall K, Park WE, Lindeman RJ. (1952). An outbreak of conjunctivitis due to Newcastle disease virus (NDV) occurring in poultry workers. *Am J Public Health* **42(6)**:672–8.

[\[edit\]](#) Footnotes

1. [^](#) [PMID 10216468](#)
2. [^](#) [JNCI correspondence](#)
3. [^](#) [PMID 4106650](#)
4. [^](#) [\[1\]](#)
5. [^](#) <http://www.avianbiotech.com/Diseases/Newcastle.htm>