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Reticulo-endotheliosis in Poultry

Yadala Ravikumar[1*], Valluru Ravikanth[1], Sriram Divya[1], Thippani Chandrawathi[2] & Gadige Ambica[3]

[1]Department of Veterinary Pathology, College of Veterinary Science, PVNRTVU, Korutla.
[2]Department of Veterinary Pathology, College of Veterinary Science, PVNRTVU, Mamnoor.
[3]Department of Veterinary Medicine, College of Veterinary Science, PVNRTVU, Korutla.

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Abstract

Avian reticuloendotheliosis (RE) is a malignant disease of poultry most frequently affecting chickens and turkeys but also waterfowl such as ducks and geese as well as other bird species. Reticuloendotheliosis virus is antigenically, morphologically, and structurally distinct from the leukosis/sarcoma group of avian retroviruses. Natural infection and disease occur in chickens, turkeys, ducks, geese, and quail; probably many species of birds can be infected. REV can be transmitted horizontally and vertically. It can also be transmitted through contaminated vaccines. Horizontal transmission of reticuloendotheliosis virus is probably more important than vertical, although both have been documented in chickens and turkeys. This virus produces three distinct syndromes: nonneoplastic runting, acute neoplastic disease, and chronic neoplastic disease resulting in B and T lymphomas. Signs for runting syndrome include weight loss, paleness, occasional paralysis, and abnormal feathering. History and clinical signs, gross pathological changes, and histological examination, immunohistochemical testing, standard and quantitative PCR assay, virus isolation, serological testing. There is currently no specific treatment or vaccine for reticuloendotheliosis except proper biosecurity measures.

Keywords: Avian reticuloendotheliosis (RE), Retrovirus, Nakanuke, Neoplasia.

Introduction:

Avian reticuloendotheliosis (RE) is a malignant disease of poultry most frequently affecting chickens and turkeys but also waterfowl such as ducks and geese as well as other bird species (Payne and Venugopal, 2000). It is a oncogenic and immunosuppressive disease, Reticuloendotheliosis bursal lymphomas are virtually identical to lymphoid leukosis B-cell lymphomas. Reticuloendotheliosis nonbursal lymphoma, a T-cell lymphoma, has been observed under laboratory conditions. Reticuloendotheliosis virus is not as ubiquitous as Marek's disease and avian leukosis viruses but is more widely distributed. The clinical course of RE may be similar to other neoplastic diseases

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including Marek's disease (MD), lymphoid leukosis (LL), or avian leukosis caused by avian leukosis virus of subgroup J (ALV-J) (Buscaglia, 2013 and Cheng *et al.,2011*). Some cases have been attributed to accidental contamination of live virus poultry vaccines such as Marek's disease virus and fowlpox virus with reticuloendotheliosis virus. Although clinical outbreaks are not frequently observed, serological surveys suggest that the virus is prevalent in both chicken and turkey flocks in many countries. It can also lead to significant economic losses in the poultry industry.

Etiology:

Reticuloendotheliosis virus is antigenically, morphologically, and structurally distinct from the leukosis/sarcoma group of avian retroviruses. The International Committee on Taxonomy of Viruses has classified reticuloendotheliosis viruses (REV) within the family *Retroviridae*, subfamily *Orthoretrovirinae*, genus *Gammaretrovirus*. Although all isolates belong to a single serotype, three subtypes of reticuloendotheliosis virus have been identified on the basis of neutralization tests and differential reactivity with monoclonal antibodies.

Host Specificity:

Host range of the virus is much broader than that of Marek's disease or avian leukosis. Natural infection and disease occur in chickens, turkeys, ducks, geese, and quail; probably many species of birds can be infected. Mammals appear refractory, although certain mammalian cell cultures are susceptible.

Epidemiology and Transmission:

REV can be transmitted horizontally (between birds) and vertically (from parent to offspring). It can also be transmitted through contaminated vaccines. Horizontal transmission of reticuloendotheliosis virus is probably more important than vertical, although both have been documented in chickens and turkeys.

Infection with REV may be transmitted by a horizontal route by direct contact between birds, indirectly by some insect vectors like mosquitos (*Culex pipiens L*) or flies (*Musca domestica L*), and also by a vertical route by eggs (Davidson and Braverman, 2005). The virus has been isolated from litter. A high rate of congenital infection has been demonstrated in naturally infected turkeys; however, such flocks are probably rare. The virus has been transmitted accidentally through use of contaminated vaccines. Most commonly, however, flocks seroconvert after 10 weeks old without clinical signs of disease or viral shedding to progeny. Experimentally, contact transmission occurs.

Pathogenesis:

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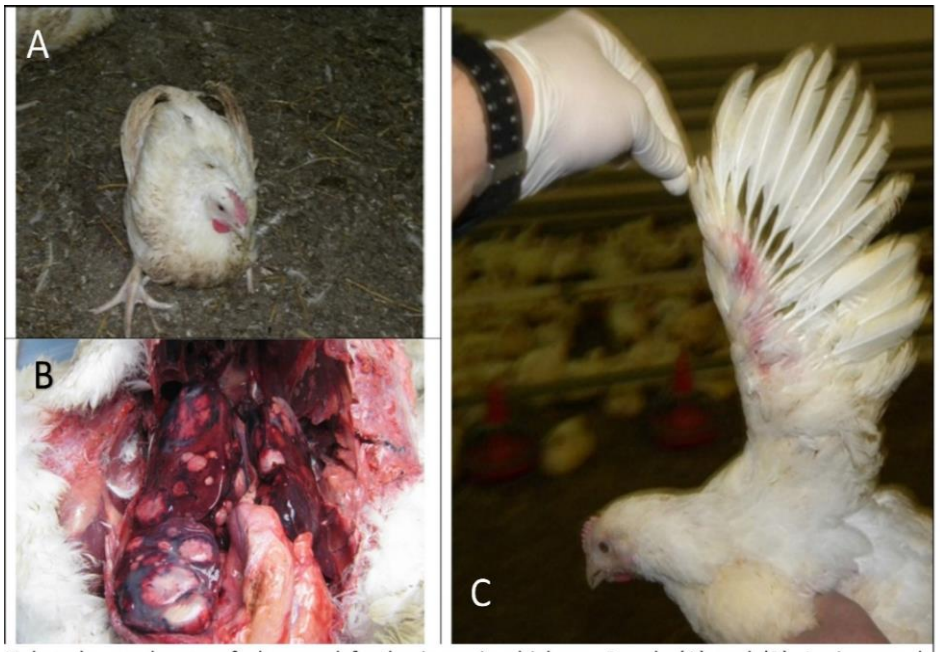
This virus produces three distinct syndromes: nonneoplastic runting, acute neoplastic disease, and chronic neoplastic disease resulting in B and T lymphomas.

- **Runting syndrome:** Typically, this lead to dramatic economic losses, is observed 4–10 weeks after administration of contaminated vaccines to day-old chicks.
- **Acute neoplasia:** It occurs after a latent period of 6–8 weeks. This involves T cells and may be confused with Marek's disease.
- **Chronic neoplastic disease:** It has been induced experimentally in chickens, turkeys, and ducks; one type occurs in chickens after latent periods of > 4 months and appears identical to lymphoid leukosis. As in lymphoid leukosis, these tumors are composed of B cells, are bursal-dependent, and have IgM on their surface.

Clinical signs and Lesions:

Signs for runting syndrome include weight loss, paleness, occasional paralysis, and abnormal feathering (Nakanuke disease, Abnormal feathering, in which the barbule of wing feathers are adhered to the feather shaft, is termed "nakanuke" in Japanese). Death from acute or chronic neoplasia is preceded by listlessness and occasionally by some of the same clinical changes described for the runting syndrome. The abnormal feather lesion, in which the barbules are compressed to the shaft over a small part of its length, may be of diagnostic value. Other lesions include bursal and thymic atrophy, enlarged nerves, and anemia (Fig. A&B).



Nakanuke syndrome of abnormal featheriness in chickens. Panels (A) and (B). Lesions and tumours in the liver of a layer chicken caused by REV infection (C). The pictures were taken by A. Mamczur.

Neoplasms typically involve the liver, spleen, intestine, and heart. The cloacal bursa is involved in the chronic B-cell lymphomas of chickens in a manner similar to that of lymphoid leukosis (Fig. C). Nonbursal (T-cell) lymphomas with shorter latent periods and lesions superficially resembling those of Marek's disease also are recognized in chickens. In turkeys,

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prominent lesions include enlarged livers and nodular lesions on the intestines; the cloacal bursa is only rarely tumorous. The tumors, regardless of type or host species, are usually composed of uniform, large, lymphoreticular cells (Etienne and Emerman, 2013).

Diagnosis:

History and clinical signs, gross pathological changes, and histological examination, immunohistochemical testing, standard and quantitative PCR assay, virus isolation, serological testing. Because lesions induced by reticuloendotheliosis virus are so diverse and resemble so closely those of other tumors, diagnosis at necropsy is difficult. A diagnosis of reticuloendotheliosis requires not only the presence of typical gross and microscopic lesions but also the demonstration of reticuloendotheliosis virus. Because reticuloendotheliosis virus is not yet as ubiquitous as avian leukosis and Marek's disease viruses, the demonstration of infectious virus, viral antigens, and proviral DNA in tumor cells has appreciable diagnostic value. The nerve lesions are usually less extensive and may contain more plasma cells than in Marek's disease but in other cases are difficult to differentiate by histological examination. The runting syndrome is easily confused with immunosuppressive syndromes due to other viral agents. The chronic B-cell lymphomas induced experimentally in chickens cannot easily be distinguished from those of lymphoid leukosis except by virus studies, including PCR assay. Similarly, the T-cell lymphomas of chickens cannot easily be distinguished from Marek's disease except by virus studies. Techniques based on immunocytochemical testing with monoclonal antibodies against cellular, tumor, and viral antigens or molecular hybridization can be used in the differential diagnosis of avian viral lymphomas, including reticuloendotheliosis (Witter *et al.*, 1970 and Woźniakowski *et al.*, 2015).

Treatment and Prevention:

There is currently no specific treatment or vaccine for reticuloendotheliosis. Elimination of vertical transmission would presumably be possible by removing potential transmitter hens; rearing progeny under isolated conditions would prevent horizontal infection. Biosecurity measures are important for preventing the spread of the disease.

References:

Payne L.N., Venugopal K.: Neoplastic diseases: Marek’s disease, lymphoid leukosis, and reticuloendotheliosis. Diseases of Poultry: World Trade and Public Health Implications. Scientific and Technical Review. Off Int Epiz 2000, 19, 564–544.

Buscaglia C.: Mixed infections of Marek's disease and reticuloendotheliosis viruses in layer flocks in Argentina. Avian Dis 2013, 57, 569–571.

Cheng Z., Zhang H., Wang G., Liu Q., Liu J., Guo H., Zhou E.: Investigations of avian leukosis virus subgroup J and reticuloendotheliosis virus infections in broiler breeders in China. Isr J Vet Med 2011, 66, 34–42.

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Davidson I., Braverman Y.: Insect contribution to horizontal transmission of reticuloendotheliosis virus. J Med Entomol 2005, 42, 128–133.

Etienne L., Emerman M.: The mongoose, the pheasant, the pox, and the retrovirus. PLoS Biol 2013, 11, e1001641.

Witter R.L., Purchase H.G., Burgoyne G.H.: Peripheral nerve lesions similar to those of Marek's disease in chickens inoculated with reticuloendotheliosis virus. J Nat Canc Inst 1970, 45, 567–577.

Woźniakowski G., Mamczur A., Samorek-Salamonowicz E.: Common occurrence of Gallid herpesvirus-2 with reticuloendotheliosis virus in chickens caused by possible contamination of vaccine stocks. J Appl Microbiol 2015, 118, 803–808.