



A review.

blue Wing Disease -chicken infectious anaemia molecular study

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Abstract

Blue wing is a diseased condition of discoloured skin of wing caused mainly by Chicken anaemia virus and or reovirus. This review designed to illustrate the causative agent/s and molecular structure of the disease, epidemiology and common characters referring to pubmed as a references search tool. The disease is major cause of anaemia in chicken and the virus possess the ability to induce apoptosis in numerous chicken derived cells and tumor cell lines.

مراجعة.

مرض الجناح الأزرق - دراسة فقر الدم الخمجي. دراسة جزيئية

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الخلاصة

الجناح الأزرق هو حالة مرضية بسبب تغير لون جلد الجناح بسبب فيروس أنيميا الدجاج و / أو الريو فيروس. تهدف هذه المراجعة إلى توضيح العامل / العوامل المسببة والتركيب الجزيئي للمرض والوبائية والصفات بالاعتماد على الموقع الالكتروني الطبي العام كأداة للبحث عن المراجع. هذا المرض هو السبب الرئيسي لفقر الدم في الدجاج ويمتلك الفيروس القدرة على حمل موت الخلايا المبرمج في العديد من الخلايا المشتقة من الدجاج وخطوط الخلايا السرطانية.

Definition and history

Infectious anaemia in chickens was observed as a new disease in baby chicks caused by a virus isolated in Japan. The disease is characterized by the incidence of plastic anaemia and general atrophy in the lymphatic tissue with the occurrence of immunosuppression, which occurs secondary complications such as infection with viruses, germs and fungi. Since its first isolation in Japan in 1979 it has since been virtually isolated from all countries that produce chicken. The causative agent

is resistant to the physical and chemicals for instance pH 3 and 80 °C for 15 minutes. This information indicates that it is difficult to get rid of it in the chicken hatch after entering it. A concentration of 10% of iodine and sodium hypochlorite sterilizers can be used to eliminate the susceptibility of the virus after treatment for two hours at a temperature of 37 °C. It appears that chicken is the only known host to be infected, so this virus does not harm humans or other animals. Horizontal transplants occur by mouth after

contamination of water and feed with chicken droppings and possibly through the respiratory system. The disease is also transmitted vertically when the mothers are free of antibodies, so the infection is transmitted to her offspring [1-8].

Basically disease is per-acute, the other name is called blue wing disease (BWD) affected early ages broilers 2-4 wks and cause haemorrhages and provide conditions for secondary bacterial infection, almost latent infection is common[9].

The disease known with aplastic anaemia which is one between different pathogenic and non-pathogenic reasons that cause this type of anaemia which lead to haemorrhagic-aplastic anemia syndrome (HAS) such as inclusion body hepatitis, aflatoxicosis, chloramphenicol (CAP) treatment, Benzene toxication, and avian osteopetrosis virus [2, 9-47] accompanied with enlargement of liver where virus mostly replicate .

BWD is a minute bleeding over the wing area changing the colour similar to bruise often happened with Chicken anemia virus CAV and presence in early ages of broilers between 2-3 wks leading to secondary infection with bacteria causing inflammation of the area[9], with blue wing disease usually accompanied viral infection[48]. The disease characterised by echymotic haemorrhage and dermatitis [49]. reovirus were isolated with CAV in chicken suffering from blue wing disease [48], the disease seen to be transmitted vertically more than horizontally [38]. Genomic CAV was detected in all CAV-infected and blue wing-diseased chickens [50]. Broiler and layer breeders are demonstrated to transmit the disease to their progeny therefore the proper biosecurity measurements are useful to control the disease [51].The disease were diagnosed as early in 12-day-old broilers in Greece [52].

Apoptin-induced apoptosis.

Chicken anaemia virus (CAV), encodes proteins that is responsible for apoptosis or

programmed cell death or cytotoxicity such as viral protein three (VP3) or so called apoptin protein, thus VP3 gene has been demonstrated to induce cancer cells death after being transfected into hepatic cancer cell line, and this apoptosis is accelerated subsequently by caspase 3 Casp3. It have been identified to induce apoptosis in chicken mononuclear cells, chicken lymphoblastoid T cells, chicken cortical thymocytes and myeloid cells but also human osteosarcoma cells in p53 independent pathway [53-59]

Etiology and molecular determinants

Chicken anaemia virus (CAV) or Porcine circovirus 2 (PCV2), which belongs to Circoviridae invade the marrow of long bones leading to acute anaemia as a sequel of interfering with haematopoiesis, thus down regulate the immune status of birds at all ages, the disease widely spread and new virulent strains were recorded in China which have been diagnosed through set of molecular approaches such as immunoblotting assay and immunofluorescent dyes[60].

Three viral receptors were determined as pathogenicity markers those are viral protein one, viral protein two and viral protein three VP1, VP2 and VP3 respectively as shown in fig 1 [61],

since the virus is highly pathogenic , all birds raised for laboratory experiments should be examined serologically for the presence of the virus which is confirmed to be remain in vaccinated birds with non-invasive vaccine three weeks after vaccination [1]

Since the disease is commercially dangerous as source of losses, immunization should be applied as a security method especially in breeders flocks , three genotypes are known, however new fourth genotype are detected in Taiwan which might consider as a mixer of two and three which refer to changeable feature of the virus [2]

VP1 is a structural protein which control assembly of the capsid which make together with viral genome the whole virus, VP1 have the ability to bind with the DNA with no specific arrangement thereby could modulate different functions [3].

Apoptin which is a nucleoplasmic shuffling protein of CAV responsible for programmed cell death in chicken lymphoblastoid cells, VP2 are demonstrated to interact with apoton and downregulate apoptosis[62].While VP3 CAV induce apoptosis [6].

CAV-Apoptin apoptotic activity could be utilised for anticancer purpose to induce apoptosis in tumor cells [63].

CAV virus interfere with proinflammatory and anti-inflammatory mediators .[7]

The virus has affinity to lymphocytes and influence T lymphocyte pathway thus influence inflammatory mediators such as

nuclear factor kabba b and then anti viral immune response [4].

Latheef, Dhama [5] found that Some herbal compounds (Withania somnifera, Tinospora cordifolia, Azadirachta indica and E Care Se Herbal) could boost immunity against the virus . Chickens and quails are both diagnosed to be infected with cav in Iran.[8]. The virus identified to pass the digestive and respiratory disease to consumers of infected chicken in south Africa [64]. ELISA test are used to detect CAV antibodies in birds [65].

However sometimes vaccinated birds showing signs of imuunosuppression and mild anemia [66]. The virus used to be phenotypic drift by which, apoptin, it mainly localize in nucleus of cancer cells, in contrary to normal cells, where it identified in cytoplasm. The virus selectively induce apoptosis in bladder tumor cells by modulating expression of tumor-associated genes. In other hand apoptin-induced apoptosis via induction of mitotic catastrophe. In mitotic cancer cells [50, 51, 67-77]

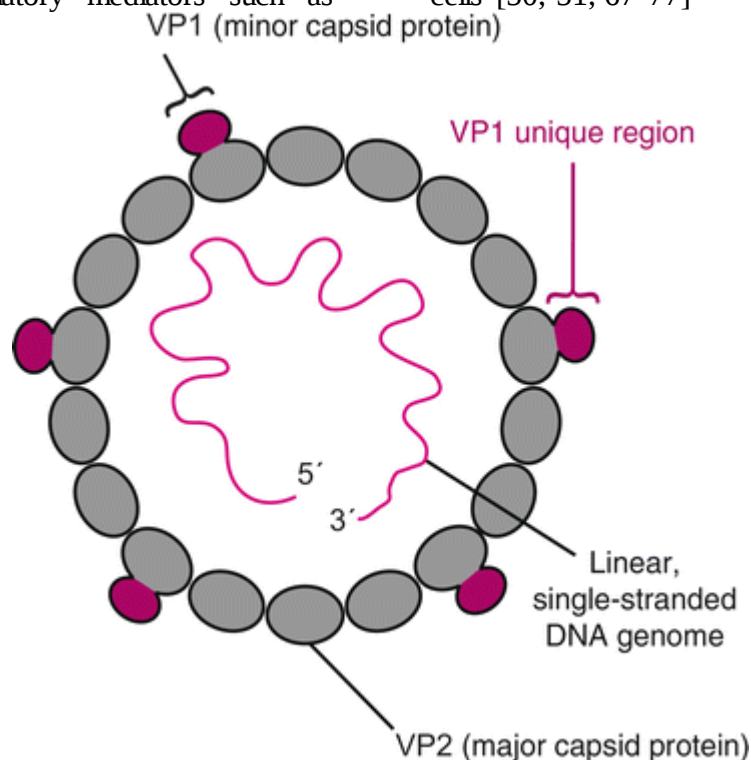


Figure 1.Structure of the virus taken from [78]

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