

# Avian infectious laryngotracheitis virus

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# Gallid herpesvirus 1 (GaHV-1) (Avian infectious laryngotracheitis virus)

- GaHV-1 is a species of virus in the order *Herpesvirales*, family *Herpesviridae*, subfamily *Alphaherpesvirinae*, and genus *Iltovirus*
- The genome of ILTV contains a 150-155 kb linear double-stranded DNA
- Viral glycoproteins are important for ILTV replication and eliciting humoral and cell-mediated immune responses in the host
- Virus sensitive to heat, ether, chloroform, and other lipolytic solvents
- Different strains of ILTV have different resistance to heat. At lower temperatures, ILTV maintains infectivity for a long period

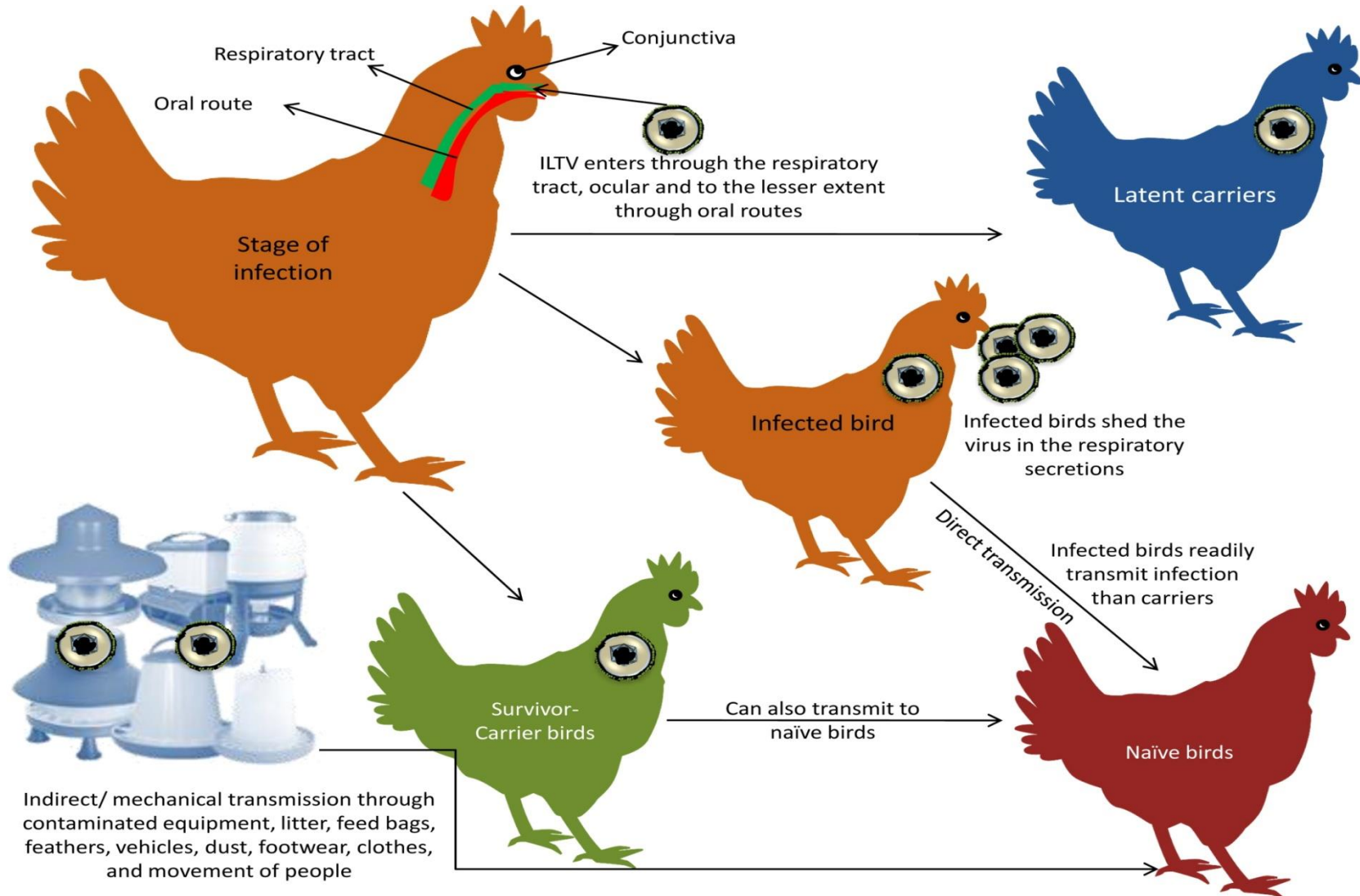
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- The virus gets readily destroyed (<1 min) by common disinfectants like 3% cresol, 5% phenol or a 1% sodium hydroxide solution
- This virus causes **avian infectious laryngotracheitis** (AILT/ILT), occurs among **chickens** worldwide
- This virus also causes disease **in pheasants**, and infections have been identified rarely in peafowl, turkeys, and ducks
- Chickens of all ages are susceptible, but disease most **common in 4-18 months aged birds**

# Transmission

- Infected birds shed the virus in their respiratory secretions for 10 days post-infection
- ILTV enters into host through respiratory tract, ocular and to a lesser extent through oral routes
- Infect birds via inhalation into trachea, or via contact with mucosal tissues of eyes or nasal cavity
- Neither vertical transmission nor transmission of virus through the egg shell has been demonstrated
- Dogs and cats retrieving dead bird carcasses from affected poultry houses also spread the infection
- The darkling beetles acts as an important carrier of ILTV in poultry environments

# Transmission of ILT virus (Image source-google)



(Image source-google)

# Pathogenesis

- Natural portal of entry of ILTV - respiratory and ocular routes
- Initial replication takes place in epithelium of conjunctiva, respiratory sinuses, larynx and upper respiratory tract to a greater extent
- results in severe damage to tracheal and conjunctival epithelial lining leading to haemorrhages and other clinicopathological manifestations in birds
- Virus also spread to liver, caecal tonsils and cloaca

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- The infected cells produce cytokines and other inflammatory mediators
  - leading to immune responses such as elevated body temperature, intensive edema, and infiltration of lymphocytes
- Latency occurs in trigeminal ganglia
- The ILTV gets reactivated once carrier birds are subjected to stressors such as vaccination, shifting, and during onset of lay
- carrier birds may shed virus intermittently after periods of stress

# The disease

- The incubation period of ILTV : 6 -14 days
- The clinical course of ILT varies from 11 days to 6 weeks depending on the form of the disease
- The clinical signs are characterized by a sudden increase in average daily mortality in the affected flock
- **Severity of the disease influenced by**
  - virulence of the virus
  - stress conditions
  - co-infections with other pathogens
  - immune status of the flock
  - age of the birds



## Clinical signs

- Mild coughing and sneezing followed by nasal and ocular discharge, dyspnea, loud gasping , moist rales, coughing and depression
- In severe cases, neck is raised and head extended during inspiration—“**pump handle respiration**”
- **Head shaking with coughing is characteristic** and may be associated with expectoration of bloody mucus and frank blood that appear on beak, face and feathers
- **Death often due to severe obstructive haemorrhagic laryngo-tracheitis**

- Morbidity approaches 100%
- Mortality 50-70% for virulent strains and about 20% for low virulent strains
- Mild respiratory signs, conjunctivitis and decreased egg production are features of infection with strains of low virulence

### **Lesions:**

- Severe laryngotracheitis:  
characterized by necrosis, hemorrhage, ulceration and formation of diphtheritic membranes

# Clinico-pathological manifestations of ILTV infection



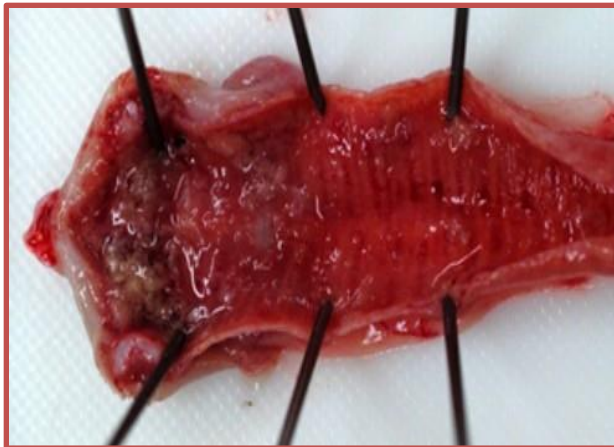
bird showing gasping



Oculo-nasal discharges



Dried bloody exudates in mouth



Haemorrhagic tracheitis



Fig. 2. Larynx and trachea, 35-week-old chicken, naturally infected by ILTV. Abundant caseous fibrinous exudate blocking the lumen, characterizing the typical gross lesion of infectious laryngotracheitis.

# Diagnosis

- Clinical signs and postmortem findings
- Detection of intranuclear inclusions in respiratory tissues
- Detection of virus-specific antigen by fluorescent antibody or immunohistochemical staining of smears and tissues
- Viral antigen can be detected in tracheal samples by ELISA or AGID
- Antibodies to GaHV-1 can be demonstrated by virus neutralization, ELISA or AGID
- Detection of virus-specific DNA by PCR assay
- Among the different clinical materials, lungs, tracheal scrapings, and exudates from trachea are ideal for virus isolation

## ILTV isolation in embryonated eggs

- In 9-11 days-old embryonated chicken eggs
- through chorioallantoic membrane (CAM) inoculation
  - Opaque plaques can be observed in ILTV infected CAM as early as 48 h post-inoculation
  - and embryo death occurs between 2 and 8 days post-infection



Chorioallantoic membrane; chicken embryo, opaque plaques induced by ILTV

## ILTV isolation by cell cultures

- Primary avian cell cultures (chicken embryo liver, chicken embryo lung, chicken embryo kidney, chicken kidney cell cultures)
- Avian leukocyte cultures
- The cytopathic effects of ILTV infection are characterized by
  - Swelling of cells, chromatin displacement, rounding of the nucleoli and syncytia formation
  - Intranuclear inclusions are detected

## Prevention and Control

- Good biosecurity practices combined with vaccination are the practical methods to control ILTV
- For breeding and egg production flocks, vaccination is widely practiced
  - Live-attenuated virus vaccines
  - Vectored recombinant vaccine (ILT gene fragments are vectored into either pox virus or turkey herpesvirus)
- ILTV vaccination is not suggested for broilers because of its economical concern
- Preventive vaccination of ILTV is given at 6 to 8 weeks of age, followed by the booster at 12 to 15 weeks for layers and breeders
- The eye drop method is considered comparatively safer and gives more protection than mass application methods like drinking water and spray administration

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## ☐ Live-attenuated virus vaccines

### i) Vaccines attenuated by multiple passages in embryonating eggs

- are higher effective
- These vaccines are used for prevention as well as during the phase of an outbreak to control virus spread and shorten its duration

### ii) generated by multiple passages in tissue culture

- generally offer less protection as they are more highly attenuated and less immunogenic
- These vaccines have undesirable properties of **reversal to virulent form** leading to vaccinal laryngotracheitis in the field
- In some occasions, vaccination leads to the **creation of latent carrier** birds, which act as a source of infection to unvaccinated flocks



- Stringent biosecurity, thorough cleaning and disinfection
- An effective biosecurity plan includes:
  - site quarantine and hygiene
  - restriction of movement of potentially contaminated workers, equipment, feed, vehicles, and birds
  - Proper disinfectant and litter decontamination
  - control of feral birds, rodents, dogs and cats accessing the barns