RECENT HP Avian Influenza H5N8

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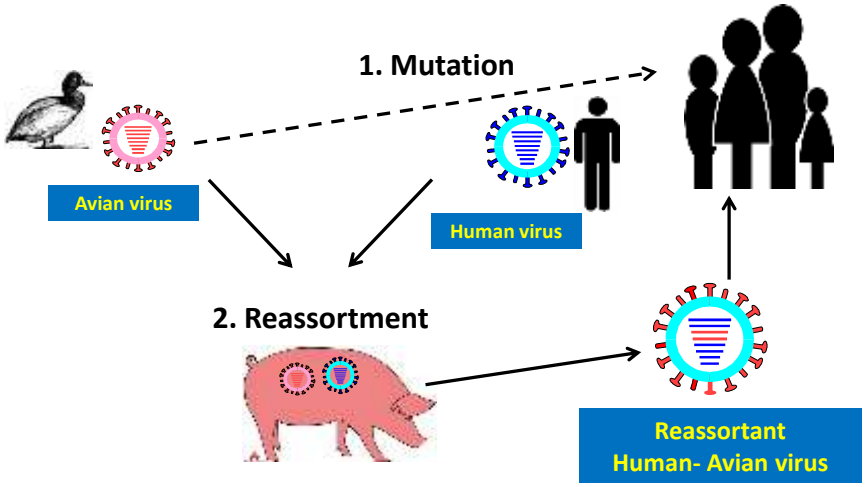
Influenza viruses

- Influenza **A** viruses:
  - infect humans and many different animals.
- Influenza **B** viruses:
  - only circulate among humans and cause seasonal epidemics.
- Influenza **C** viruses:
  - can infect both humans and pigs but infections are generally mild and are rarely reported.
- In humans:
  - A and B viruses are of epidemiological importance

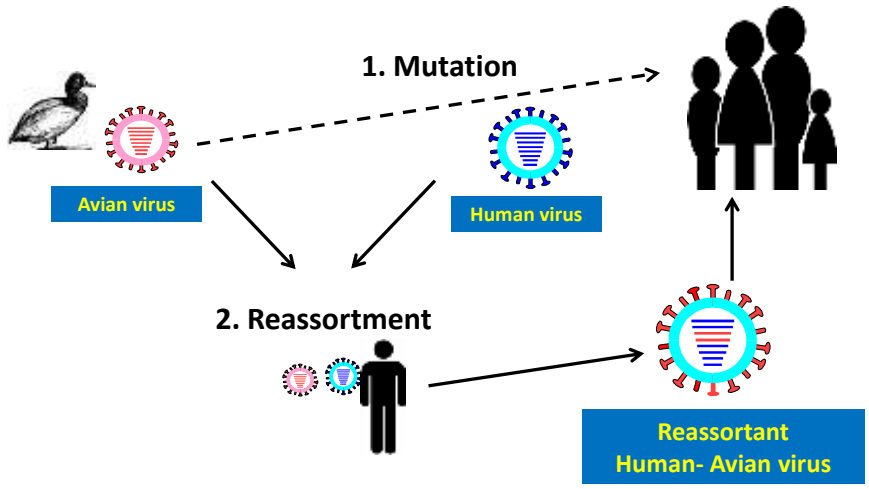
Avian influenza

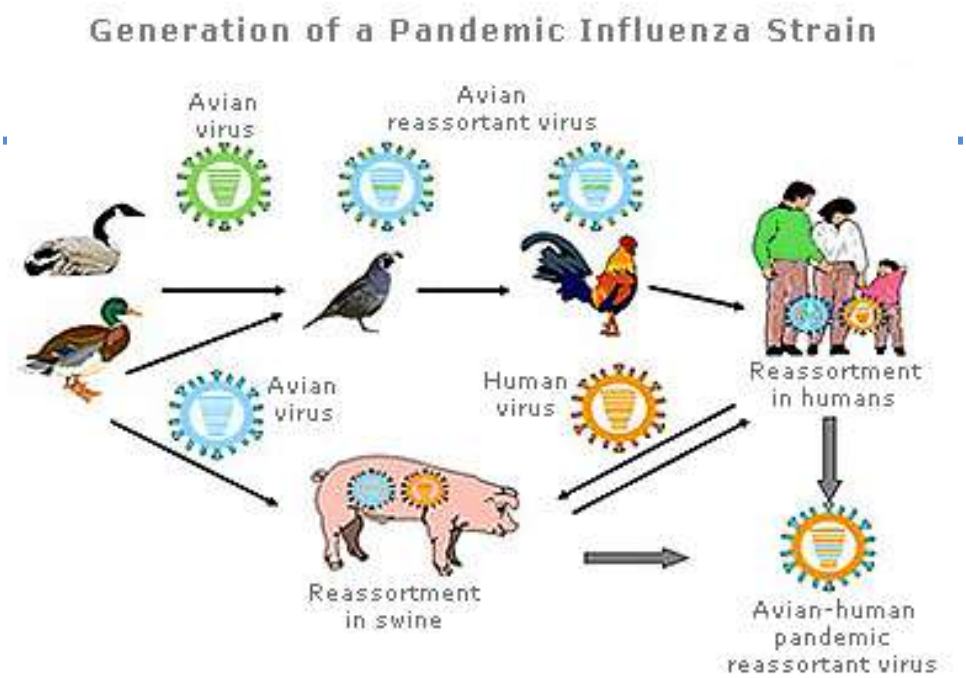
- It is a virus that affects both domestic and wild birds
- It has less frequently been isolated from other mammalian species
- The AIv is shed in faeces and respiratory secretions of infected birds, therefore be spread through direct contact with the secretions contaminated water and feed also carried on fomites
- Wild water birds are reservoirs of the avian influenza virus and the virus may therefore be transmitted through wild birds and their migratory routes

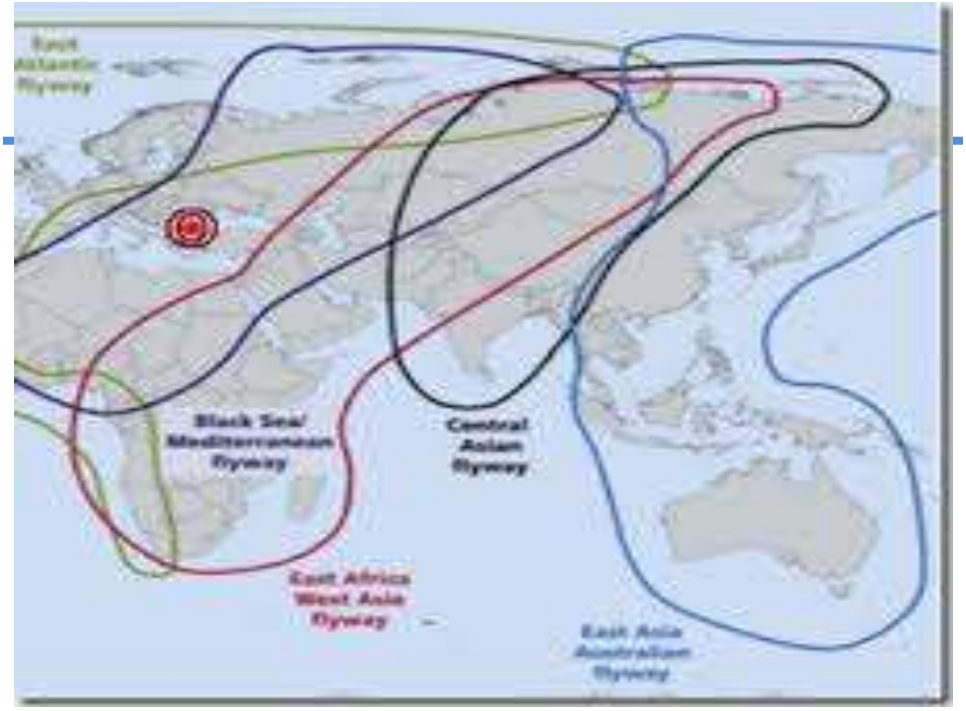
Emergence of novel viruses: Mutation and Reassortment 1



Emergence of novel viruses: Mutation and Reassortment 2







What is the role of wild birds in H5N8 HPAI?

- **Wild birds have been shown to be a reservoir for LPAI virus strains, with low prevalence**
- **Phylogenetic investigations of the current HP H5N8 AI virus strains (within clade 2.3.4.4) and those strains circulating from 2014-2016 without causing the death of wild birds during long distance migration ????????**
- **Transmission mechanisms (Limited) H5N8 HPAI virus strains by involved in poultry production and trade remains significantly high**
- **H5N8 and human health** The OIE/FAO has concluded that the virus is still a bird virus without any affinity for humans.
- **A total of 8 mutations and deletion in the NS1 at amino acid position 80-84 (conserved H5 were observed in the H5N8 2016 viruses. might decrease the zoonotic potential .**
- H5N8 2016 belong clade 2.3.4.4 and more virulence IVPI= 3

H5N8 HPAI

- **2012 H5N8 HPAI virus was first detected in domestic poultry in China .**
- **2014, multiple outbreaks of H5N8 HPAI occurred in domestic poultry and in wild birds (Korea, Japan, China, Germany, Netherlands, UK and USA.**

- 2016, H5N8 HPAI outbreaks were reported in wild birds and/or domestic poultry in Korea (3), Russian (5), India (10), 13 countries of Europe, Israel, Iran, Egypt and Tunisia).

H5N8 HPAI

- **From late October 2016 to early February 2017, HPAI H5N8 has been detected in wild migratory birds or captive birds on the territory of 21 Member States**

- **In 17 Member States the virus has spilled over to poultry holdings leading also to lateral spread between poultry holdings.**

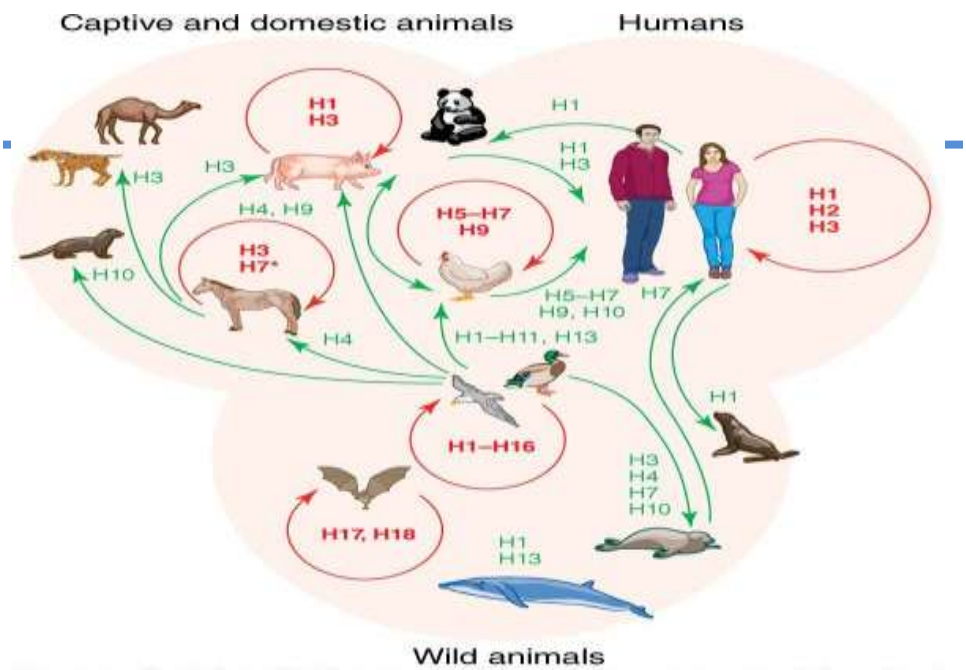
- **A second HP AI subtype A(H5N5) has been detected in wild birds and recently also in poultry holdings in Germany**

Important data of H5N8 HPAI

- **Case-based information**:

virus type, date of onset of disease, country of reporting, country of exposure, sex, age, exposure, clinical information, severity.

- **Analyze the epidemiological data as soon as possible on (HPAI) and (LPAI), where co-circulating or linked within the same epidemic, from HPAI disease and Host determination**



Information from Short, K. R., et al. 2015. "One health, multiple challenges: The inter-species transmission of influenza A virus." *One Health* 1:1–13.

Human infections

- To date, no human cases of infection with influenza A(H5N8) have been detected.
- Human cases with related clade 2.3.4.4 A(H5N6) viruses have been detected and reported in China.
- Human infections with A(H5) viruses: rare and occur among those exposed to sick/dead infected birds (or their environments).

Improved early warning of farmers

shall be taken into account:
— Drop in feed and water intake higher than 20 %,
— Drop in egg production higher than 5 % for more than two days,
— Mortality rate higher than 3 % in a week,
— Any clinical sign or post-mortem lesion suggesting avian influenza.

— samples to be collected from dead/contacted birds and subjected to laboratory tests for detection AI

Improved early warning

Notification in case of:
- Clinical problems
- Mortality > 0.5% on two consecutive days (animals > 10 days);
  > 1.0% incase of meat type Turkeys
- Reduction of food or water consumption, or of egg production > 5%

Veterinarian can collect cloacal/tracheal swabs to be tested in PCR for exclusion of AI

Early action

- **Passive surveillance of dead or moribund wild birds ……. it has utility for the detection of this ongoing HPAI H5N8 2018 epizootic.**
- **If HPAI has been identified previously in the same species of wild bird in the same region shown the same findings no needed further laboratory analysis for diagnosis**

Establishment of areas A and B:

- Part A, a high risk area comprising the 3km and 10km zones,
- Part B, a low risk area,

As the wild bird involved, which the HPAIV H5N8 has spread over a greater geographical area Therefore, the areas A and B will cover a larger surface in the ongoing HPAI H5N8 epizootic compared to the HPAI H5N1 epizootic ten years ago.

Observations on Poultry Farms area consist of three zones

- An **open zone** without activities related to poultry farming which is connected to the public road and separated from other zones
- A **professional zone** with poultry farming activities storage feed and materials without access of poultry
- A **production zone** with farming activities storage of material (litter, eggs)that was in contact with poultry

Serological monitoring LPAI

- Each farm tested at least 1 a year for antibodies against LPAI
- Farms having outdoor housing are tested 4 times/year
- Turkeys and Ducks are tested each cycle .

In case of positive serology (H5/H7): expert team visit with clinical inspection and collection of samples for PCR. A PCR positive farm will be culled.

Molecular Diagnostics: AIV rRT-PCR

Samples: tracheal/oropharyngeal swabs preferred, cloacal swabs, tissue (lung, spleen)

Advantages

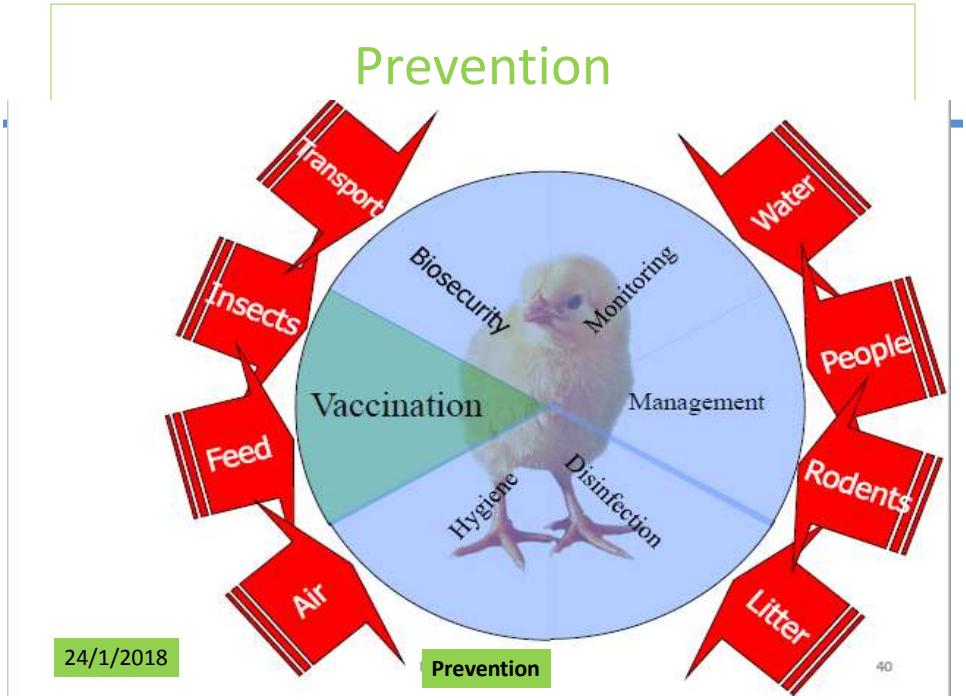
- **Rapid (2.5 hours)**
- **Highly sensitive/specific**
- **Differentiates type A, H5, and H7**

Disadvantages

- **Expensive equipment**
- **Moderate per test cost ($8)**
- **Special facilities required**
- **False negatives – genetic variation**

Yu Z, Cheng K, Sun W, Zhang X, Xia X, Gao Y. **Multiple adaptive amino acid substitutions increase the virulence of a wild waterfowl-origin reassortant H5N8 avian influenza virus in mice.** Virus Research. 2017 Nov 4; 244:13-20. doi: 10.1016/j.virusres.2017.11.002. [reference]. *Mouse-adapted variants of a wild waterfowl-origin H5N8 HPAIV were generated to identify adaptive mutants that confer enhanced pathogenicity in mammals. The mouse lethal doses of the mouse-adapted variants were highly reduced compared to the wild-type virus and the variants displayed enhanced replication in vitro and in vivo, and expanded tissue tropism in mice. Sequence analysis revealed four amino acid substitutions in the PB2, PA, HA and NA proteins.*

Son K, Kim YK, Oem JK, Jheong WH, Sleeman JM, Jeong J. Experimental infection of highly pathogenic avian influenza viruses, Clade 2.3.4.4 H5N6 and H5N8, in Mandarin ducks from South Korea. Transboundary and Emerging Diseases. 2017 Dec 20. doi: 10.1111/tbed.12790. [reference]. Comparative pathogenicity and infectivity of Clade 2.3.4.4 Group B H5N8 and Group C H5N6 viruses were evaluated in Mandarin duck (Aix galericulata). Ducks infected with either types showed no clinical signs or mortality. HA antigenicity was similar for both viruses and no replication occurred after cross-challenging. Viral replication and shedding through the cloaca were higher for H5N8 than H5N6-infected ducks.




Thank you