



Avian Influenza at Animal- Human Interface

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Annual Meeting: Sentinel Hospital Influenza Surveillance Project
Holiday Inn, ChiangMai
October 27, 2010

เชื้อไวรัสไข้หวัดใหญ่ที่มีการติดเชื่อในคน



- **Human influenza viruses**
 - A/H1N1
 - A/H3N2
 - B
 - A/H2N2 (สาปสูญไปแล้ว)
- **Avian influenza A viruses**
 - H5N1, H7N2, H7N3, H7N7, H9N2 ,H10N7

Avian influenza viruses



- Highly pathogenic avian influenza (HPAI) viruses: H5, H7
- Low pathogenic avian influenza viruses: all H and N subtypes

Ancestors of H5N1 viruses



Hong Kong 1997 viruses

H gene from A/goose/Guangdong/1/96(H5N1)

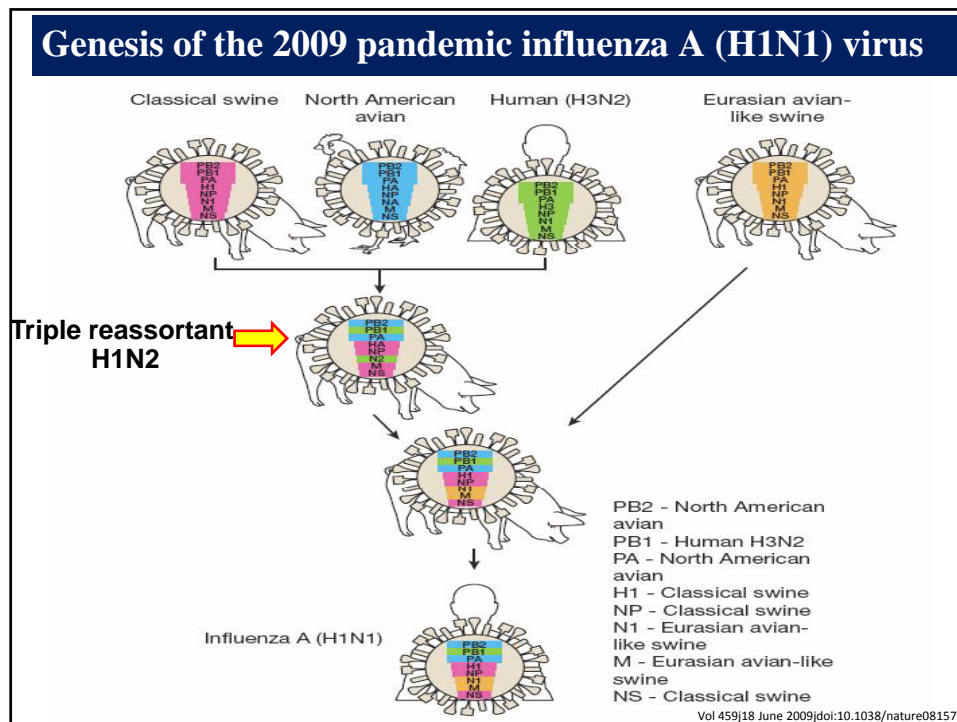
N gene from A/teal/HongKong/W312/97(H6N1)

Internal genes from A/quail/G1/97(H9N2) or
A/teal/HongKong/W312/97(H6N1)

H5N1 viruses after late 2003

H and N genes from

A/goose/Guangdong/1/96(H5N1)



Ancestors of A/2009(H1N1)



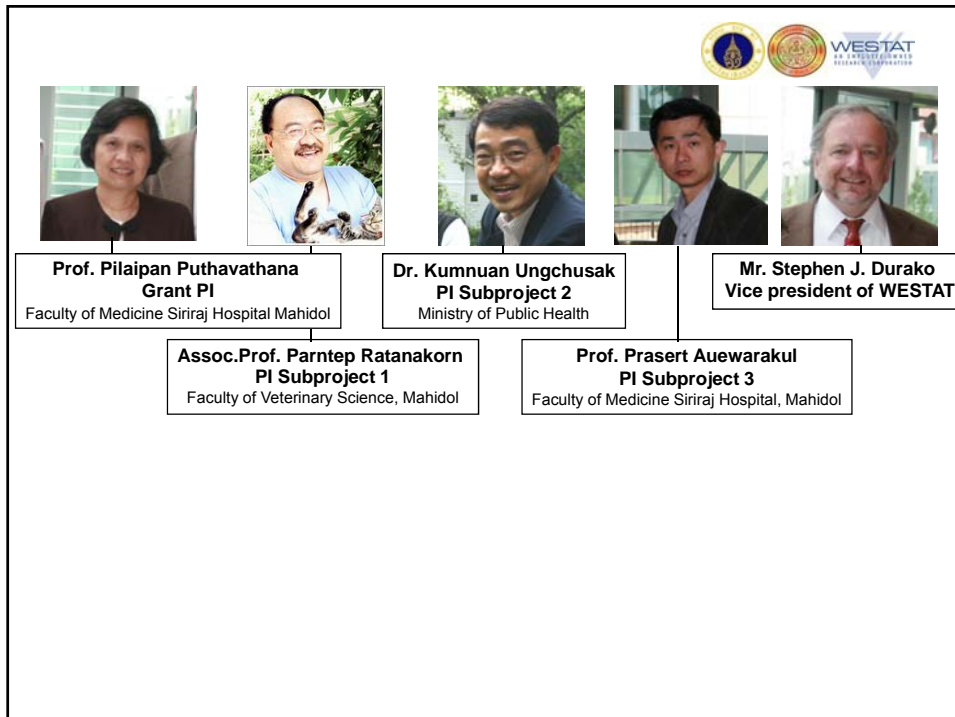
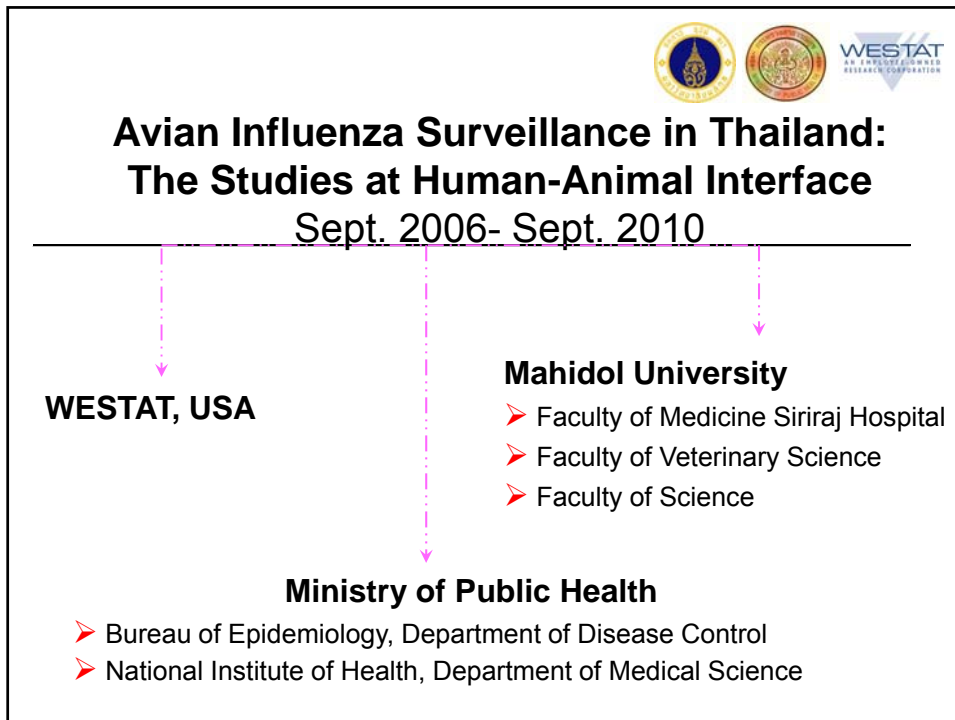
- PB1 from human H3N2 virus
- PB2, PA from North American avian
- N1, M from Eurasian avian
- H1, NP and NS from classic swine



Cross species transmission



- HPAI H5N1 virus can cross from avian to other species: dogs, cats, tigers,.....
- H1N1pdm from humans could infect pigs.
- H1N1pdm could infect cats in laboratory.





Subproject 1.

การเฝ้าระวังการติดเชื้อไข้หวัดนกในนก
อพยพ และ นกประจำถิ่น และบทบาทในการ
แพร่เชื้อ

Surveillance for HPAI H5N1 virus infection in
migratory and domestic bird populations, and
evaluation of their roles in the spread of the
AI viruses



Satellite telemetry

- **Satellite transmitters** (Microwave Telemetry, Inc. MD., USA) with
 1. Standard solar transmitter
 2. Solar Argos/GPS transmitter
- **Argos satellite system :**
 - CNES (French Space Agency)
 - NOAA (National Oceanic and Administration)
 - CLS (Collecte Localisation Satellites)



Satellite transmitters



Asian open bill storks

www.thaiwildlife.com



<http://www.flickr.com/photos/arifbd111/3349579046>

Brown headed gull

www.birdingintaiwan.org/Birdsintwn/greategret.htm



Lesser whistling duck




Great egret

<http://www.birdingintaiwan.org/Birdsintwn/greategret.htm>



Original places of bird tracking



The study birds

Type of birds	Total birds tracked	Total loss	Length of yrs the tracking data was collected			No.alive
			1	2	3	
Open-billed stork	5	3	1	2	2	2
Lesser whistling duck	4	4	(<6m)			0
Brown headed gull	8	5	5	0	0	3
Great egret	3		3			3
Total	20	12	16	2	2	8



**Subproject 2: การสำรวจหาผู้ป่วยไข้หวัดนก
และ การติดเชื้อในกลุ่มเสี่ยงเนื่องจากอาชีพ**

Surveillance for AI cases in Thailand,
and assessment of AI transmission
among people at risk of occupational
exposure by national guideline



Lab techniques used to diagnose AI

- **Real time RT-PCR**
 - WHO protocol for H5N1 virus
 - CDC protocols for H1, H3, H5 and flu B
- **MicroNT assay** for antibody to H5N1 virus
- **Seeplex kit** (Seegene, Korea), a conventional based PCR, for 12 respiratory viruses including influenza A and B



No AI patient was detected in Thailand throughout the study period.

Thailand reported 25 AI cases with 17 deaths.

The first case was reported in January 2004, and the last case in July 2006.



- No AI case was observed among 308 patients with severe CAP at SawanPracharak and Uttradit Hospitals during June 2007 to December 2008.
- Totally, 19 (6.2%) cases of influenza were diagnosed (10 flu A and 9 flu B).



Search for asymptomatic infection

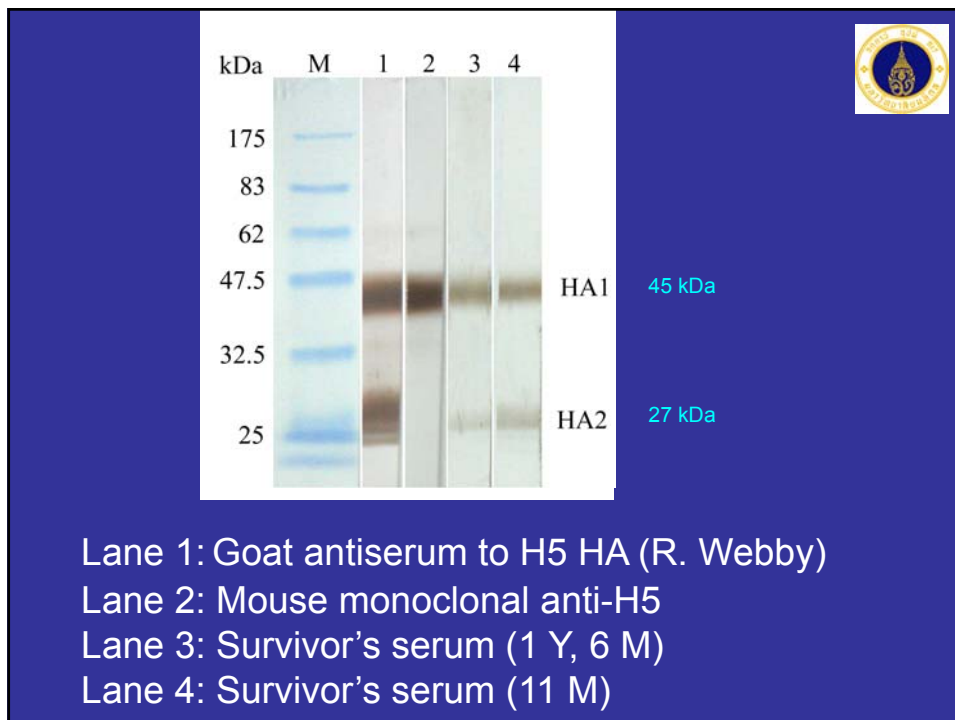
Assessment of human transmission in 20 provinces where AI outbreaks repeatedly occurred



H5N1 NT titer of ≥ 40 in poultry farmers

Area	Number paired serum of test	Number of case with NT titer ≥ 40 (%) to		
		A/Thailand/1 (KAN-1)/04(H5N1)	A/Thailand/NYK 676/05(H5N1)	A/chicken/Thailand/IC RC-V143/07(H5N1)
Lower north (1 province)	11	0 (0.0)	0 (0.0)	0 (0.0)
Central (8 provinces)	404	1 (0.2)	2 (0.5)	1 (0.2)
South (1 province)	5	0 (0.0)	0 (0.0)	0 (0.0)
Total	420	1(0.2)	2 (0.5)	1(0.2)

Mild symptomatic/asymptomatic contact cases with NT titer ≥ 40				
Subjects	Number tested	Number pos.	NT Ab titer to	
			Kan-1/04	NYK676/05
Cullers	28	1(3.6%)	320	640
Health care workers	57	2 (3.5%)	80,40	160,80





Subproject 3

การวิเคราะห์ลักษณะทางพันธุกรรมของเชื้อไข้หวัดนก

(Sequence analyses of H5N1 AIV in Thailand)

Genotypic characterization

- Reduced diversity of the viral sequences indicates a bottleneck effect on the viral population in Thailand, and there are evidences of reassortments among the remaining lineages.
- The viruses remain relatively stable in term of genetic markers for adaptation to mammalians.

Phenotypic characterization

- All H5N1 virus isolates in this study were sensitive to oseltamivir and zanamivir.
- All preferentially bind α -2, 3 linked sialic acid.

Acknowledgements

Financial support

- US CDC
- Mahidol University
- Thailand Research Fund for Senior Research Scholar

US CDC

- Dr.Diane Gross
- Dr.Jaquerine Katz
- Dr. Mark Simmerman
- Mr.Steward Nichols

Consultants

- Prof. Robert Webster
- Dr .Adrian Farmer
- Dr. Hon Ip

Westat Co.

- Mahidol University
- Ministry of Public Health
- Department of National Park and Wildlife Conservation
- Department of Live Stock and Development
- Local Advisory committees
- All Thai partners, staffs and field investigators

