

# INFLUENZA VIRUS AND PANDEMIC



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# What is Pandemic Flu?

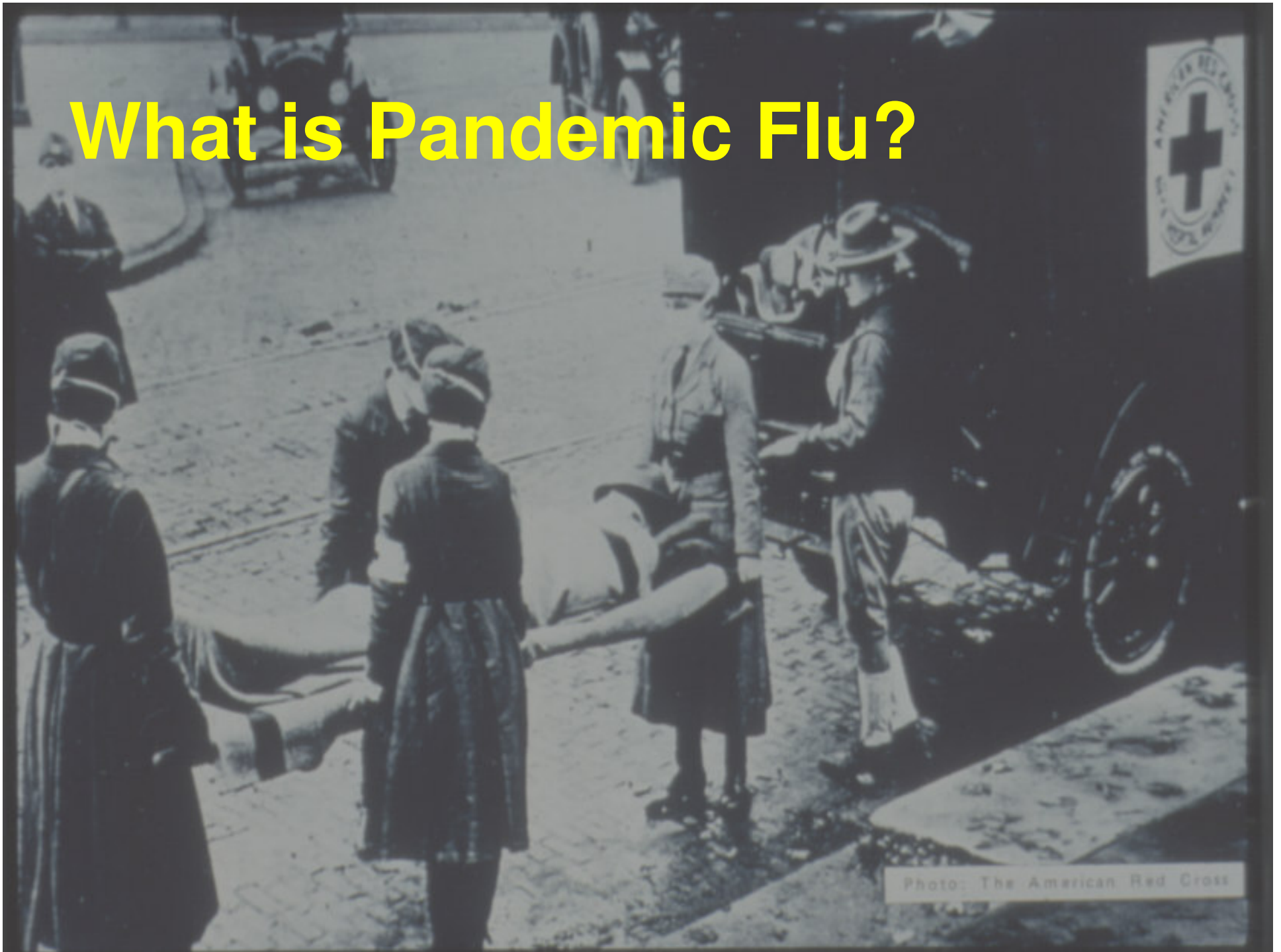
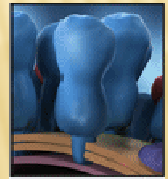
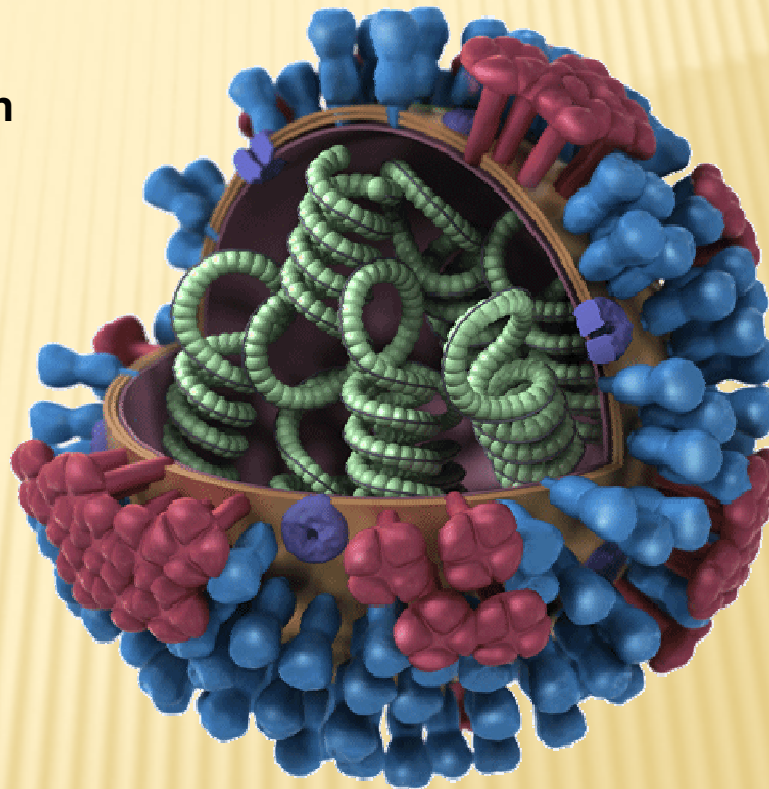
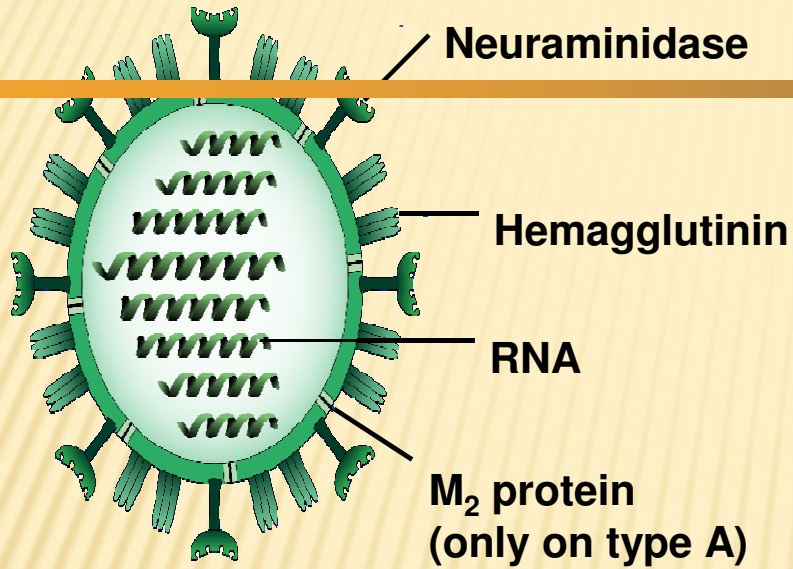


Photo: The American Red Cross

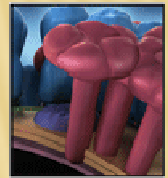


**But first, what is the Flu?**

# INFLUENZA SURFACE PROTEINS



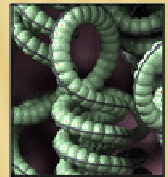
Hemagglutinin



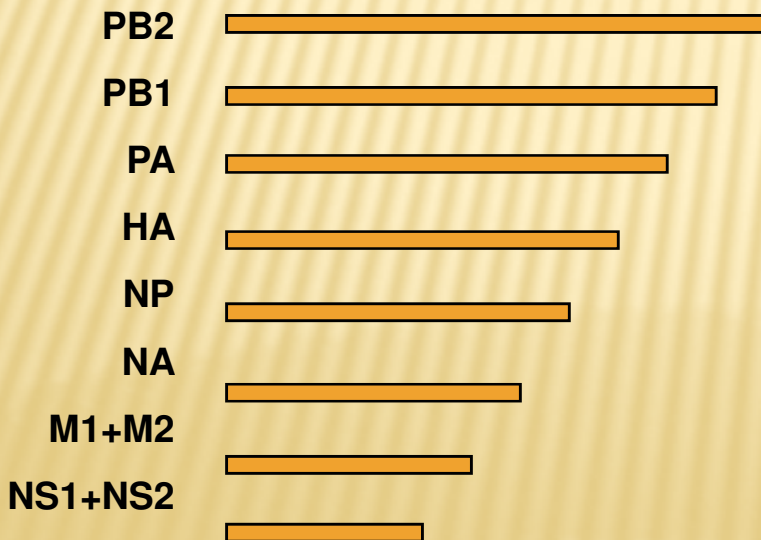
Neuraminidase



M2 Ion Channel

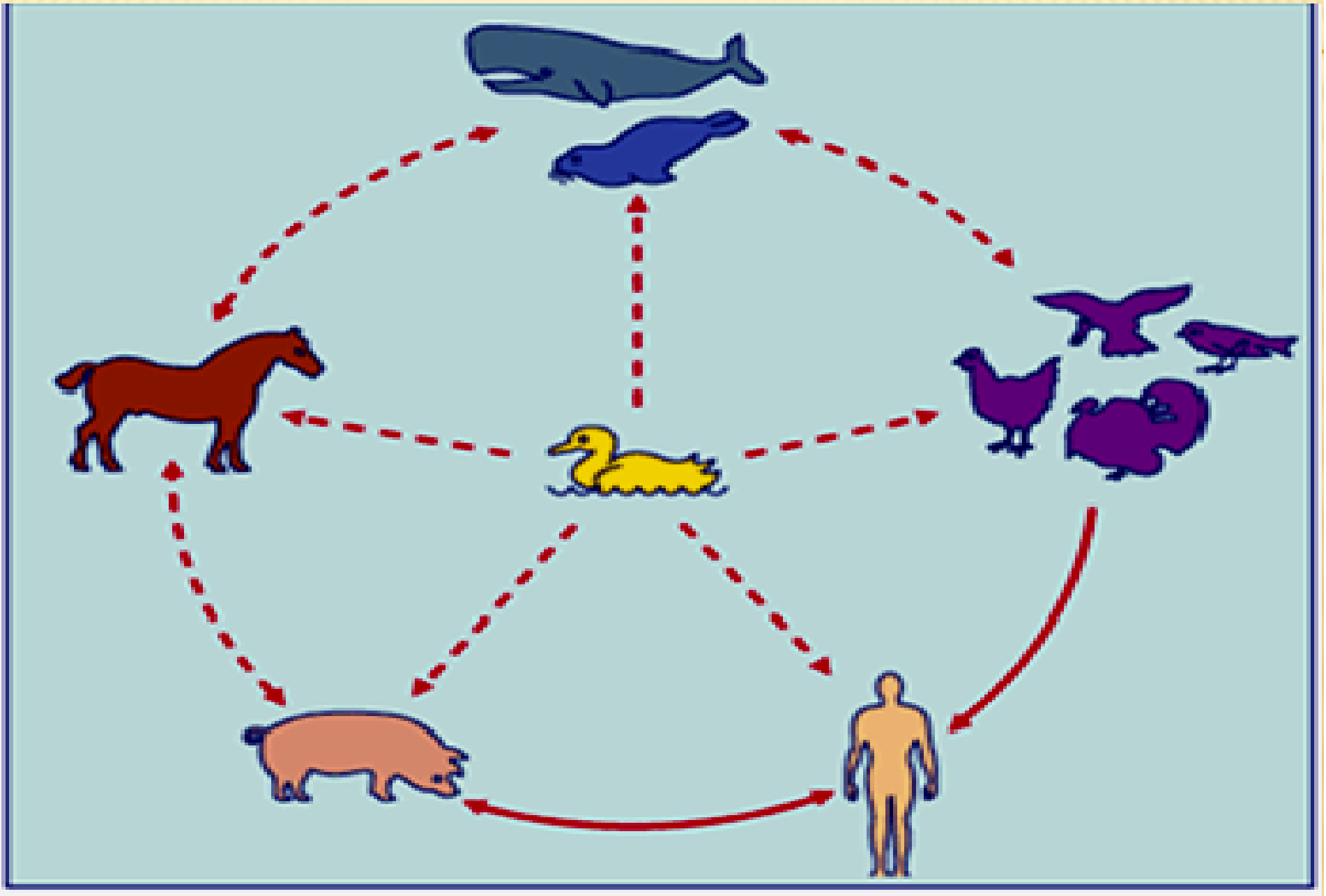


RNP





# Various reservoirs of Influenza A virus





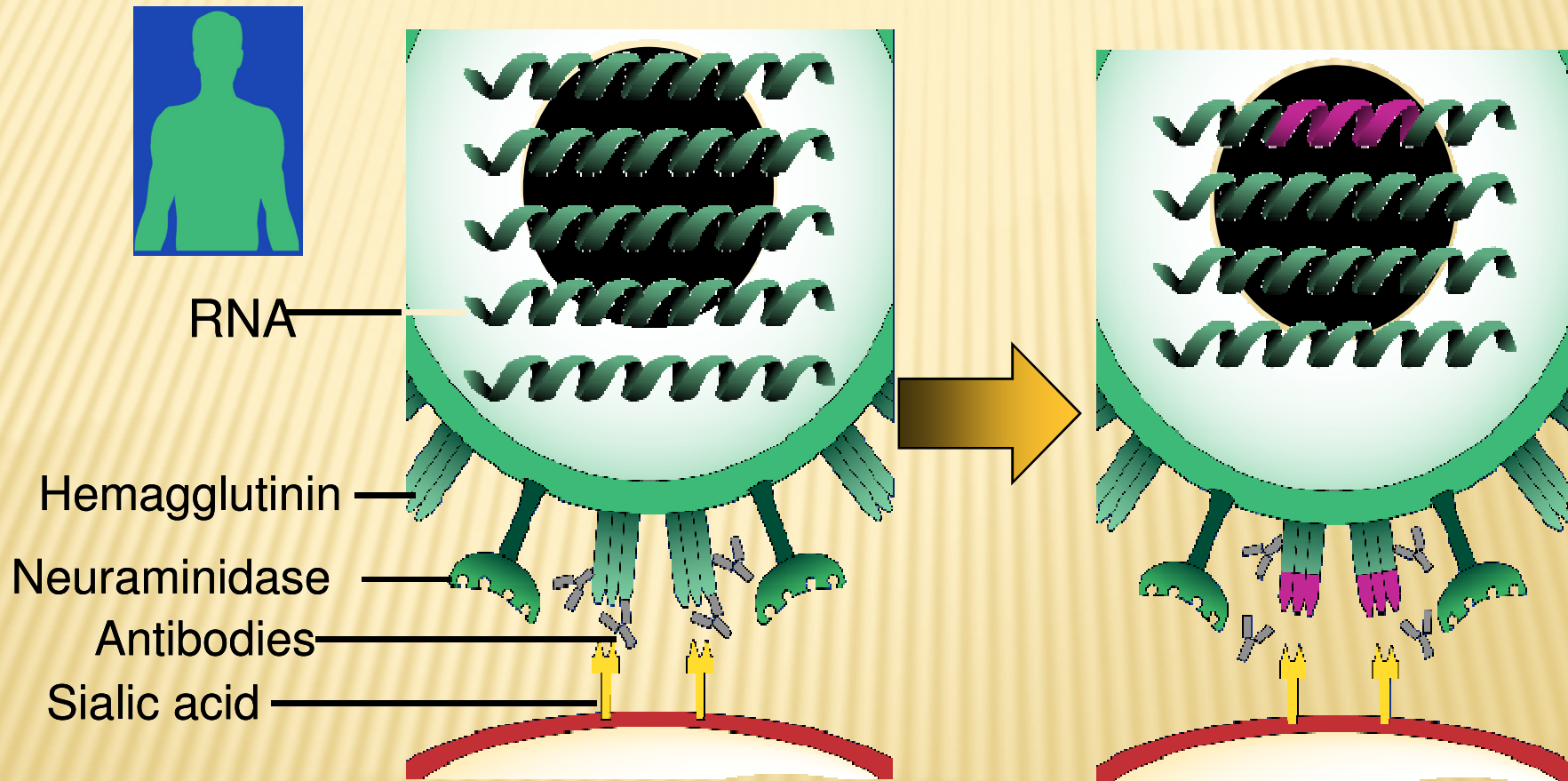
# Influenza Virus: 3 Types

- ✓ RNA virus
- ✓ Antigenically distinct
- ✓ No cross-immunity

Type A	Type B	Type C
Causes significant disease: epidemics; pandemics	Causes significant disease: milder epidemics	Does not cause significant disease
Infects both humans <i>and other species!</i>	Limited to humans	Limited to humans
Frequent antigenic variations	Infrequent antigenic variations	Antigenically stable

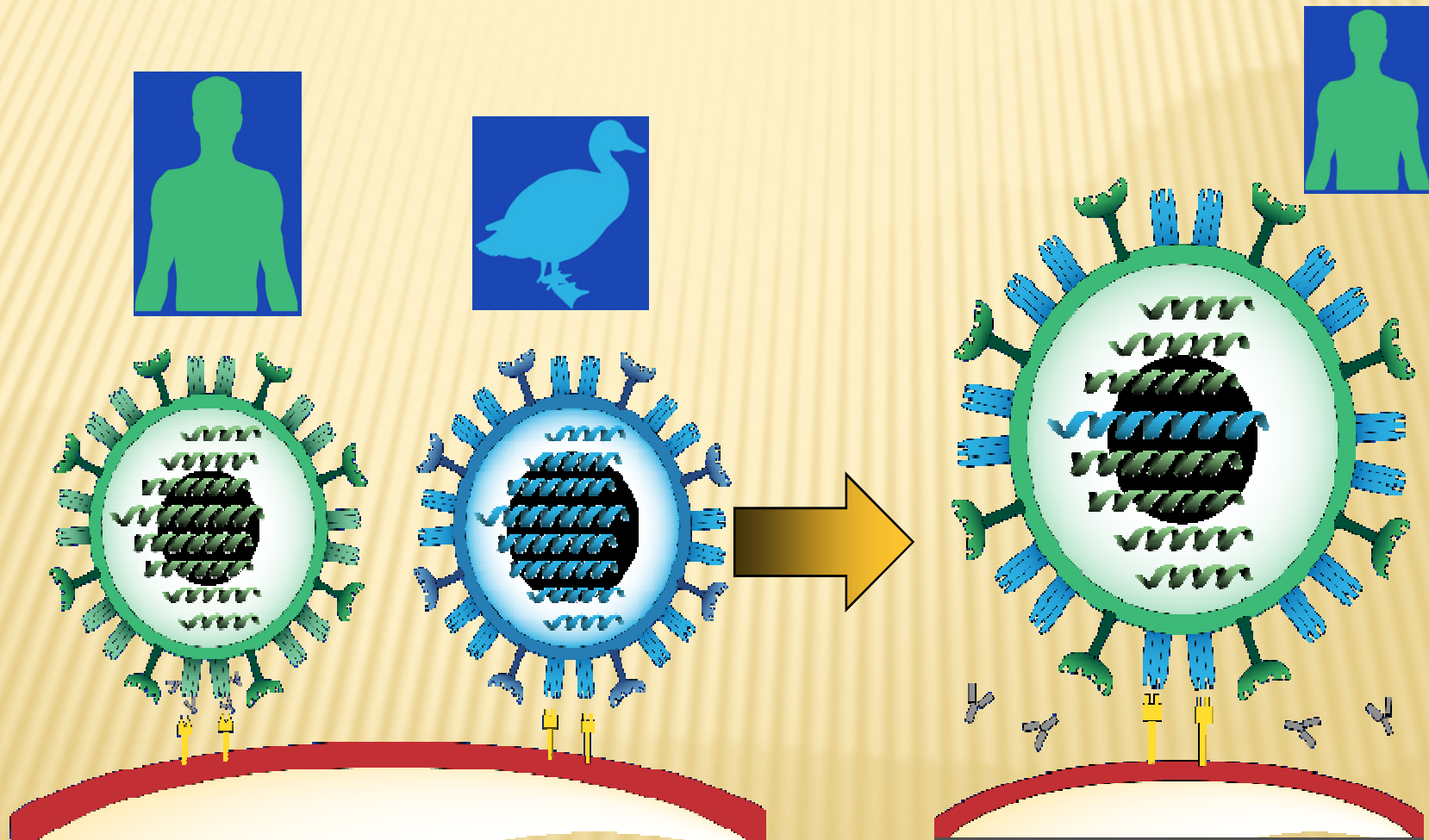


# ANTIGENIC DRIFT





# ANTIGENIC SHIFT





# TRANSMISSION BETWEEN HUMANS

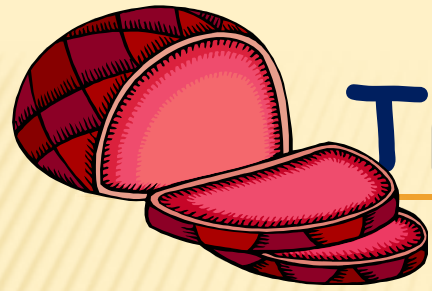
- ✘ **Respiratory droplets of coughs and sneezes**
- ✘ **Influenza viruses may also be spread when a person touches respiratory droplets on another person or an object and then touches their own mouth or nose**
- ✘ **Influenza virus can survive from a few second to 48 hours — depending on the specific virus and the type of surface**



# HOW THE FLU SPREADS







# Transmission to humans

- ✘ Transmission of swine/Bird influenza virus from pigs/Chicken to humans never occurs by eating properly cooked pork (at about 160<sup>0</sup> F/70<sup>0</sup>C)





# SYMPTOMS OF FLU IN HUMANS

## Symptoms of Swine flu

### Systemic

- Fever
- Lethargy

### Nasopharynx

- Runny nose
- Sore throat

### Muscles

- Pain

### Joints

- Pain

### Psychological

- Lack of appetite

### Respiratory

- Coughing

### Gastric

- Nausea
- Vomiting

### Intestinal

- Diarrhea

✓ **Fever (94%),**

✓ **Cough (92%)**

✓ **Sore throat (66%)**

✓ **Diarrhoea (25%)**

✓ **Vomiting (25%)**

(N England J Medicine  
2009;361:1—10)

# COMPLICATIONS

- × *Pneumonia*
- × *Respiratory failure*
- × *Convulsions*

(Jamieson DJ et al.2009)



# Influenza Pandemics so far



**1918: "Spanish Flu"**

**50 million deaths**

**A(H1N1)**



**1957: "Asian Flu"**

**1-4 million deaths**

**A(H2N2)**



**1968: "Hong Kong Flu"**

**1-4 million deaths**

**A(H3N2)**

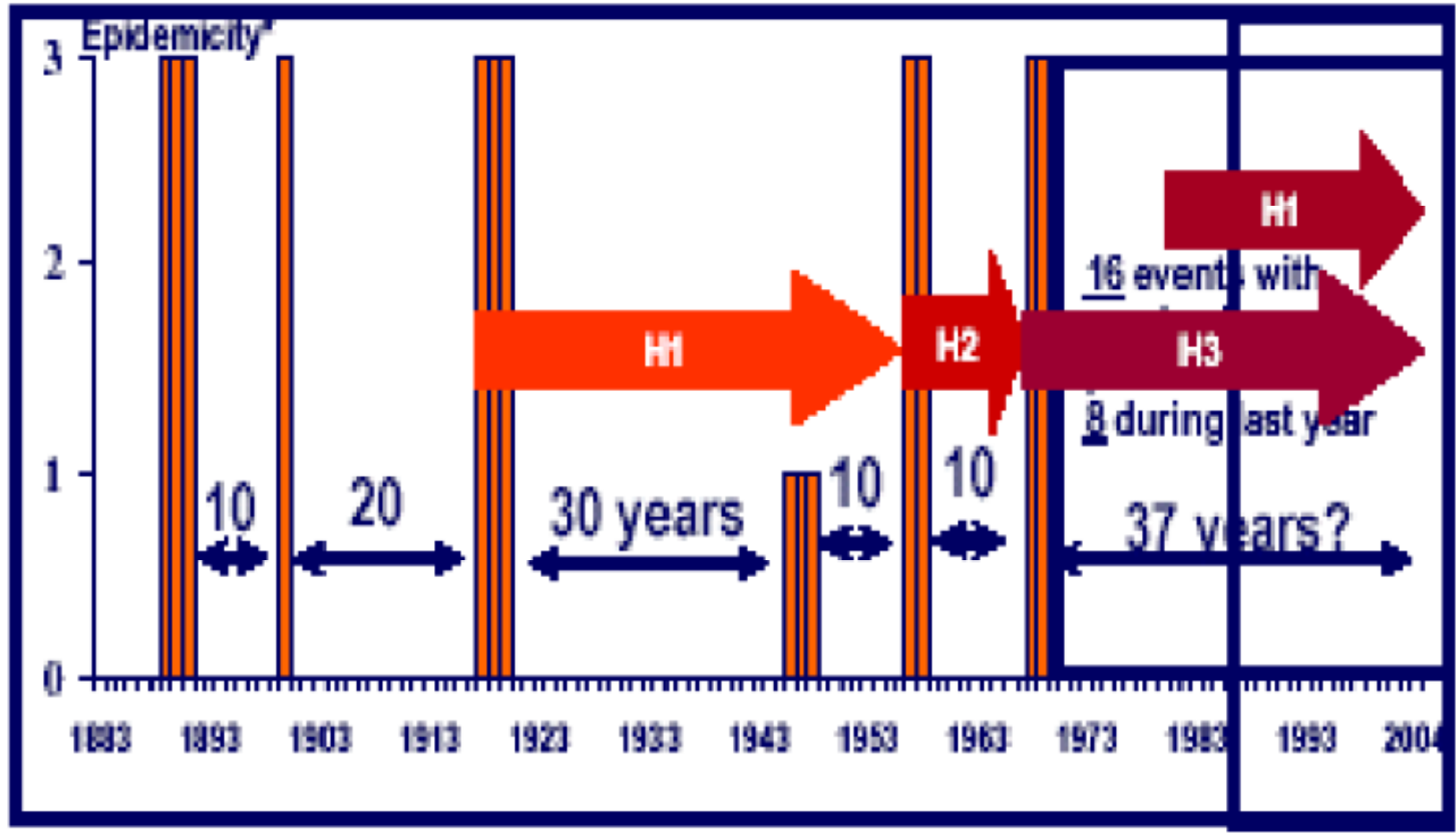


**2004-09: Current outbreak**

**421 cases, 257 deaths  
Azerbaijan, China,  
Cambodia, Djibouti,  
Egypt, Indonesia,  
Iraq, Lao's PDR,  
Myanmar, Nigeria,  
Pakistan, Thailand,  
Turkey, Vietnam &  
B'desh; till Apr. 2009**

**A(H5N1)**

# Recorded Influenza Pandemics



1: epidemic, 2: probable pandemic, 3: pandemic

Potter, C.W: Textbook of Influenza by Nichols, Webster, Hay, Blackwell Science 1998





# × Diagnosis







• **National Institute of Virology is well Equipped for detection of Seasonal and new variant viruses**  
**Public Health authorities can work to together**



# Human resource development through training

## Sample collection



## Inoculation in tissue culture and eggs







INCUBATOR	SL-1000
TYPE OF INCUBATOR	SHAKE INCUBATOR
INCUBATOR	SL-1000
INCUBATOR	SL-1000
INCUBATOR	SL-1000
INCUBATOR	SL-1000
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INCUBATOR	SL-1000

**OBTAINING PRECISE COINCUBATION**

- 1. Monitor Temperature (37°C), Humidity (95-98% RH) and CO<sub>2</sub> level (5%).
- 2. Open the door, keep bottles inside being incubated and use incubator manual to introduce and maintain CO<sub>2</sub> incubator atmosphere.
- 3. Do not keep door open for long time.
- 4. Close door immediately!
- 5. Check the digital display (40).
- 6. Monitor the digital water level in the jacket of incubator, when necessary pour water through digital display and distilled water.
- 7. Adjust digital water in the top door in real time.
- 8. Check the incubator with 30% ethanol.
- 9. Always keep one CO<sub>2</sub> cylinder in standby to replace exhausted cylinder.

MSM-15





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# OVERVIEW OF PANDEMIC AND PREVENTION