

# Leadership in crises and disasters

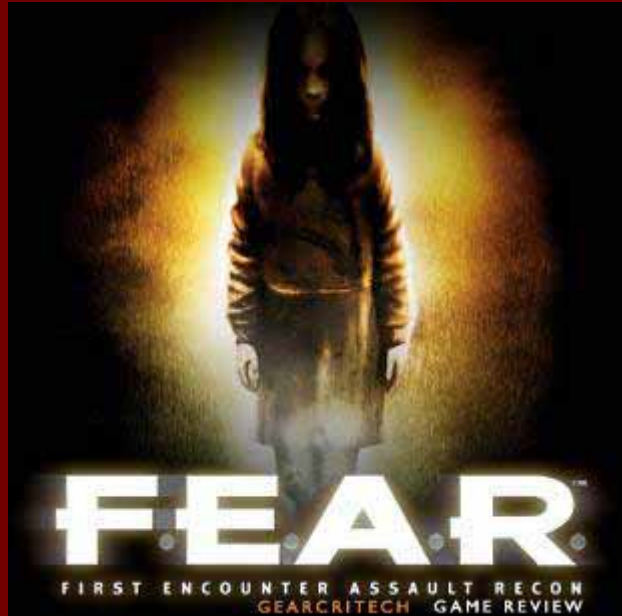
Infections and epidemics

Professor Peter Collignon

Infectious Diseases and Microbiology, The Canberra Hospital and The Australian University

# Fear

We are all affected!





# Health and infections

- No one is really in charge
  - Leadership issue
- Advice vs. Executive power
  - Who had the power anyway?
- Police and enforcement may be a big issue
  - Irrational behavior
  - Self motivated behavior

# Fear in Infections

- Best approach is information
- Adequate understanding

# What to do?

- Take appropriate precautions based on this knowledge
- Appropriate actions based on knowledge
- BUT - Knowledge may be incomplete!

# Bird Flu



Don't Panic - Yet

# H5N1

- We cannot ignore the current bird flu, but a pandemic is not "inevitable"
- A major worry currently
  - but mainly if you are a chicken!



# Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO

## 7th August 2006

Country	2003		2004		2005		2006		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Azerbaijan	0	0	0	0	0	0	8	5	8	5
Cambodia	0	0	0	0	4	4	2	2	6	6
China	0	0	0	0	8	5	11	7	19	12
Djibouti	0	0	0	0	0	0	1	0	1	0
Egypt	0	0	0	0	0	0	14	6	14	6
Indonesia	0	0	0	0	17	11	37	31	54	42
Iraq	0	0	0	0	0	0	2	2	2	2
Thailand	0	0	17	12	5	2	2	2	24	16
Turkey	0	0	0	0	0	0	12	4	12	4
Viet Nam	3	3	29	20	61	19	0	0	93	42
Total	3	3	46	32	95	41	89	59	233	135

Total number of cases includes number of deaths.  
WHO reports only laboratory-confirmed cases.

**Mortality 58%**



# Birds

Influenza is a widespread virus

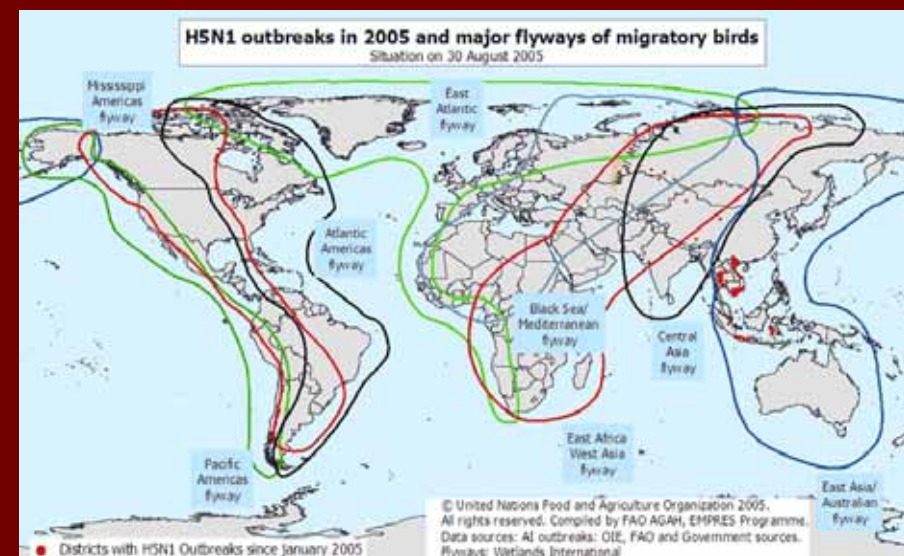
H5 just one of 15 different H types

H5N1 is highly pathogenic.  
In SE Asia, China, Indonesia  
Europe now Africa

Migratory birds

Poultry

Ducks major reservoir



# Timeline

## Started in birds in 1996 (or earlier)



### H5N1 avian influenza: timeline

10 March 2006

#### Previous events in Asia

date	animals	humans
1996	Highly pathogenic H5N1 virus is isolated from a farmed goose in Guangdong Province, China.	
1997	Outbreaks of highly pathogenic H5N1 are reported in poultry at farms and wet markets in Hong Kong.	Human infections with H5N1 are reported in Hong Kong. Altogether, 18 cases (6 fatal) are reported in the first known instance of human infection with this virus.
Feb 03		Two cases of H5N1 (one fatal) are confirmed in a Hong Kong family with a recent travel history to Fujian Province, China. A third family member died of severe respiratory disease while in mainland China, but no samples were taken.

# Other animals also at risk

- Mainly accidental



- Cats

- Pigs

- dog



- people



# People have close contact with birds



# people

- Not that many infected (184)
  - But how many not diagnosed?
    - Bleeding, pneumothorax
- Not convincing person to person
- But high mortality if infection however (58%)
- If stays in current form H5N1 is NOT a major problem to people



# How is it spread

We assume respiratory route but -

- Aerosols
- Droplets
  - Hand to nose, mouth
- Water
  - ducks
- Food
  - Raw chicken
  - Very unlikely if cooked



# immunity

- Why are children disproportionately represented?
- Some type of natural immunity with age?
- Many older people equally exposed but less infections



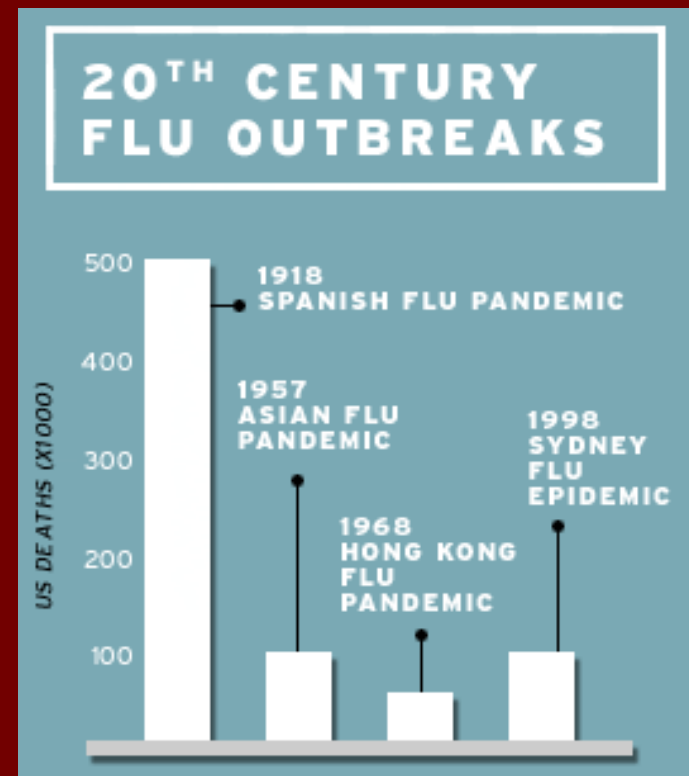
# 1918

- Major disaster world wide
  - 50% infected
  - Maybe 5% mortality
- 20 million dead
  - 10,000 in Australia
- Disproportionately young adults



# Other pandemics

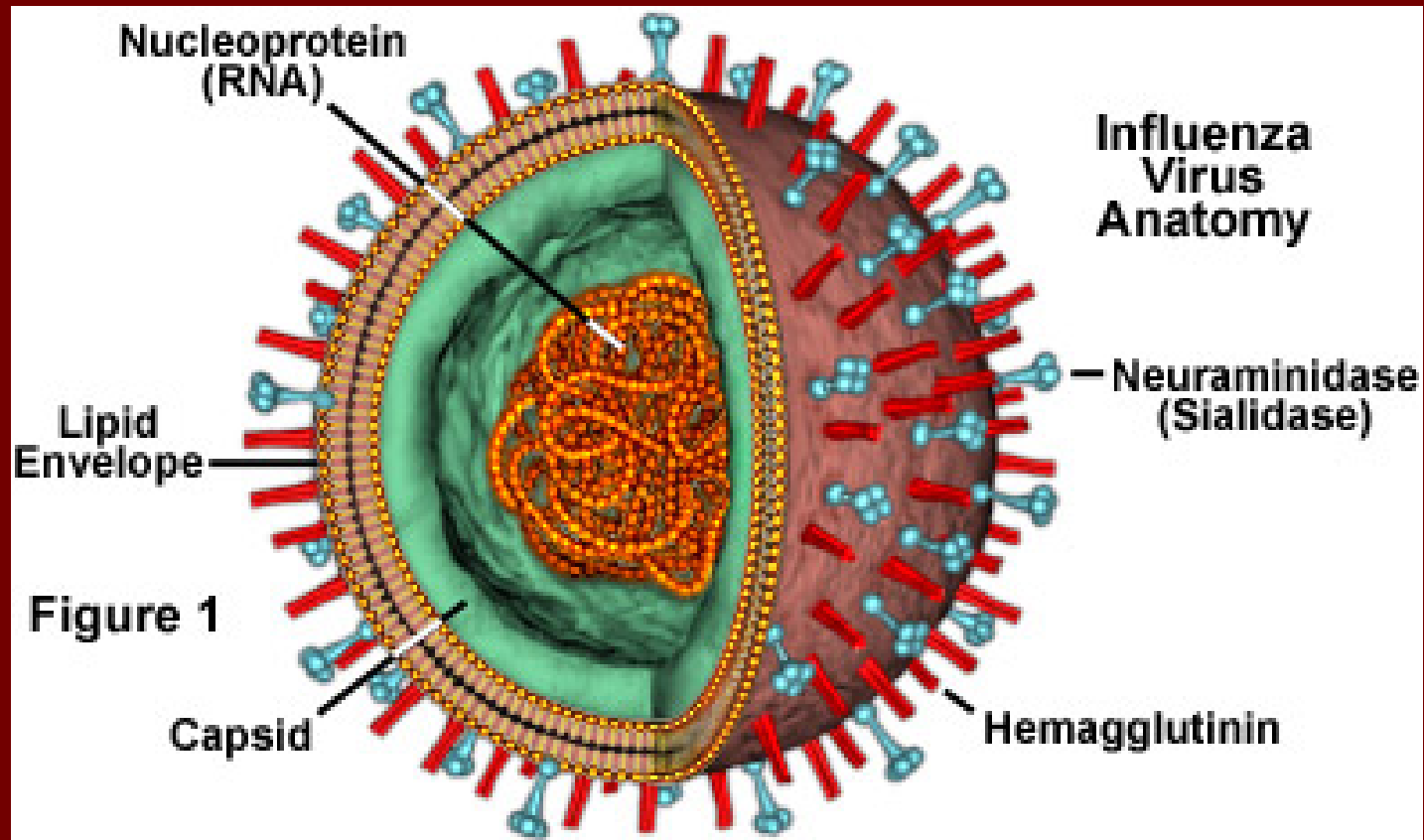
- H2 (Asian) and H3 (Hong Kong)
- All likely SE Asia in origin
- H1 (Spanish) in Kansas



# Where did H5N1 come from

- Hong Kong 1997 in people
- Then Vietnam variation 2004 in people
- 2 different types
- China in Birds at least since 1996
  
- Rearrangement of H9N2 strain and H6N1 strain in quail.
  - Then to wild birds

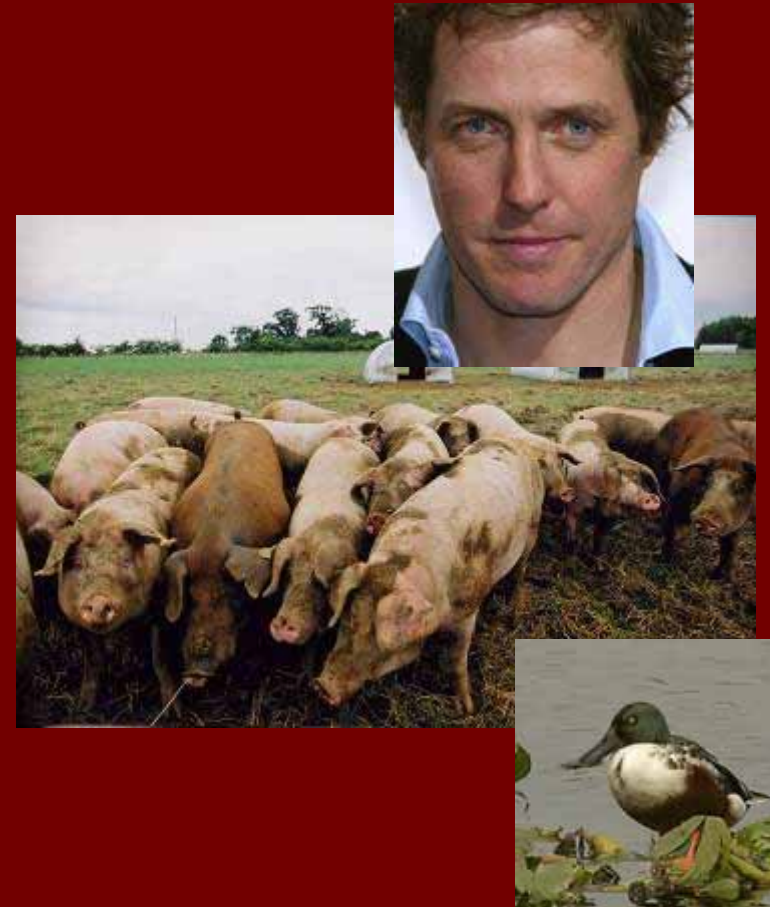
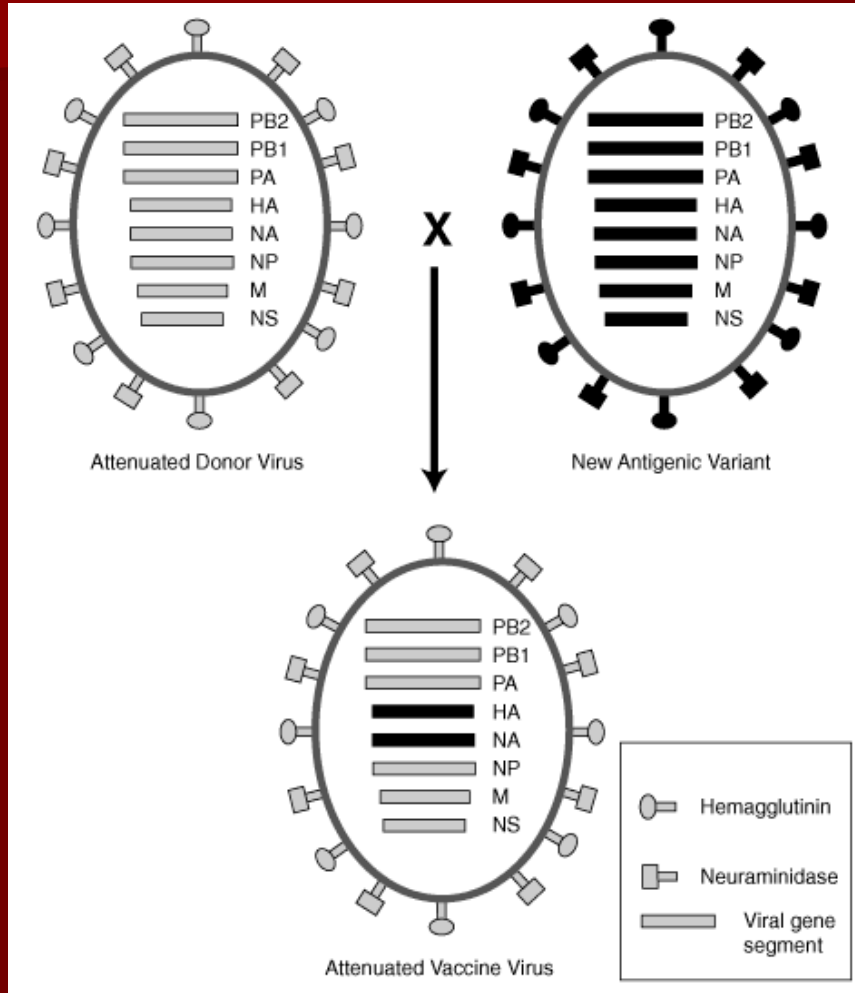
# Influenza virus structure



# Pigs are major concern

- RNA reassortment
- Can more easily carry human and bird influenza virus at same time

# Reassortment of RNA genes



# New pandemic ?

- Yes one is inevitable
  - But not necessarily H5N1
- Probably 3 pandemics every century
  - So one will come again!

# Control – stop infection spreading

- Infection control
  - Hygiene
  - Quarantine
  - Avoiding large mixing and congregation of people
- 
- This buys us time
    - For vaccine
    - Drugs
    - Or change in virulence



# Infection control is Key

- Hand hygiene
- Personal protective equipment
  - Masks
  - Gloves
  - Gowns
- Keep people separated from those with infection
- Don't recirculate air
- Basic hygiene
  - Cough etiquette

# Watch your eyes and nose

- Droplet spread
- Hands taking virus to eyes and nose may be very important

# Movements restricted

## **PUBLIC NOTICE**

In view of the severity of the present

### **Epidemic of Influenza**

and in order that all efforts may be concentrated on the stamping out of the disease, the local Board of Health, after consultation with Kingston Medical Society and the Mayor, has enacted that after Oct. 16th, and until further notice,

1. Theatres and Moving Picture Houses shall be closed and remain closed
2. Churches and Chapels of all denominations shall be closed and remain closed on Sundays.
3. All Schools, Public or Private, including Sunday Schools, shall close and remain closed.
4. Hospitals shall be closed to visitors.
5. No public shall be admitted to courts except those essential to the prosecution of the cases called.
6. The Board advises the public most strongly not to crowd into street cars and to avoid as much as possible any crowded train or an assembly of any kind.

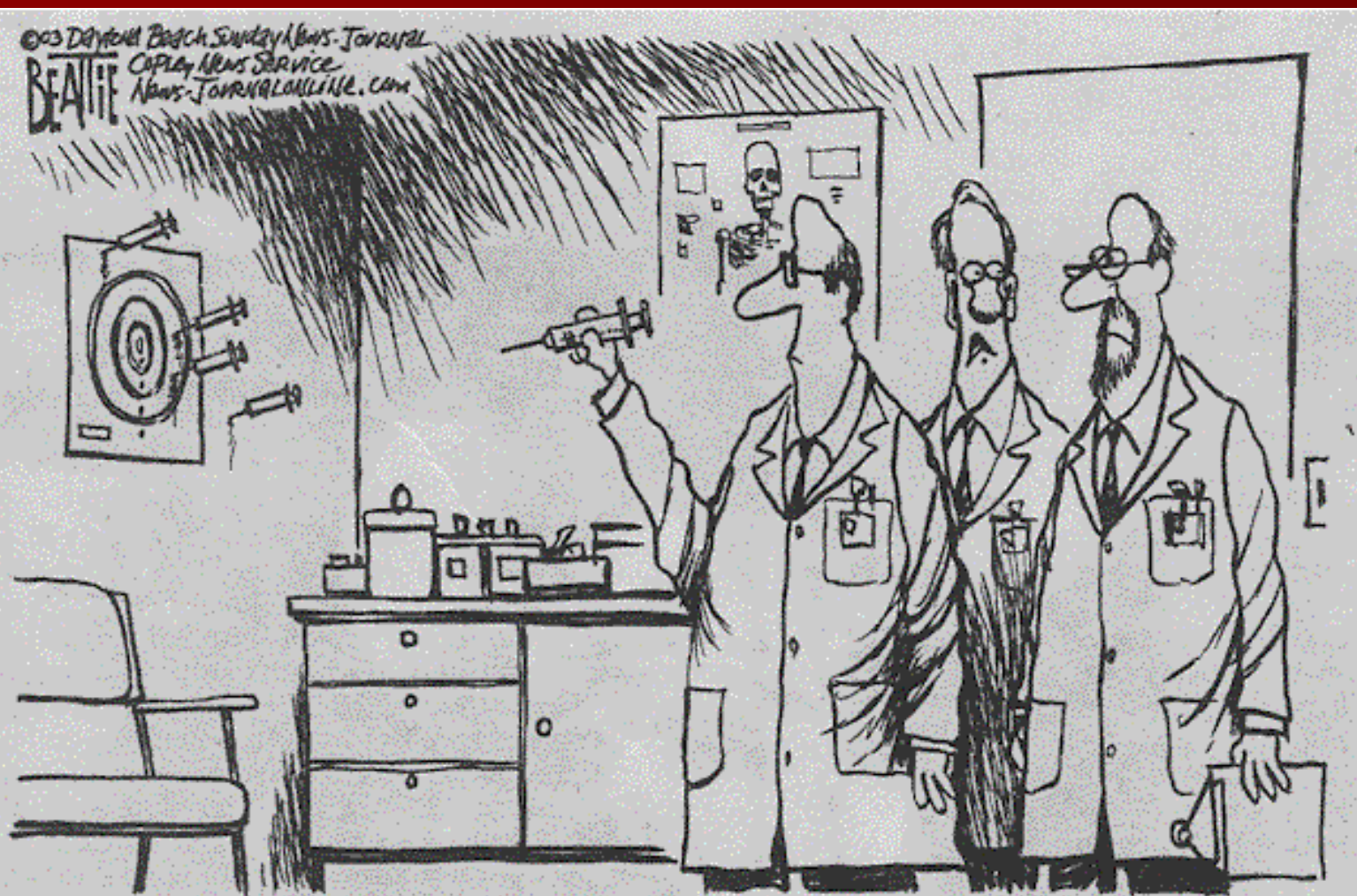
Provisions have been made by the Kingston Medical Society whereby all cases applying for assistance will receive the same either by registered practitioners or by final year medical students acting under instructions. Therefore every case of illness should send in a call to a physician.

A. R. B. WILLIAMSON,  
Medical Health Officer.

# Vaccines

- Only realistic population protection option

©03 Dayton Beach Sunday News Journal  
CAPLEY NEWS SERVICE  
News-JournalOnline.com



"I hate it when we're not sure we're inoculating against the right strain of flu virus."

# Vaccine logistics

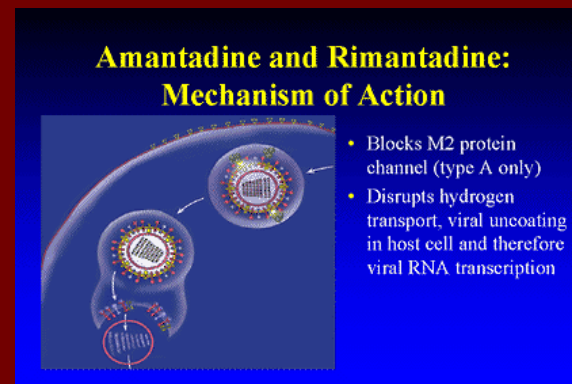
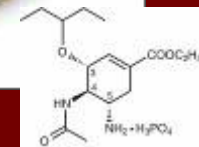
- Needs to be developed
  - Maybe higher dose, adjuvant
  - Other technology
- 
- Currently 8 million doses in Australia now
  - So feasible to scale up
  - ?give H5 as primer

# Problems with vaccine

- Side effects main concern
- Especially if pandemic does not occur!
- Swine flu in US
- Many extra cases of ascending paralysis were vaccine related (8 per 1 million vaccinated)
  
- Monetary cost
  
- Limited manufacturers

# Drugs

- Neuraminidase inhibitors
  - oral oseltamivir (Tamiflu)
  - Inhaled zanamivir (Relenza)
- Uncoating inhibitors
  - amantadine
  - rimantadine



# Logistics of drugs

- Won't work as prevention!
  - Australia alone
    - 1 course for one week
    - 20 million people for 6 months or maybe a year
    - 1 Billion courses!

# Do drugs work anyway?

- Some doubt
- Recent Cochrane review
  - Lancet. 2006 Jan 28;367(9507):303-13. Antivirals for influenza in healthy adults: systematic review. Jefferson T et al.
- Vietnam experience
  - Mostly not good outcome but therapy late
  - PCR viral load decreased in some

# resistance

- Vietnam
- 2 of 8 treated with oseltamivir developed high level resistance in isolates during therapy



de Jong et al. Oseltamivir resistance during treatment of influenza A (H5N1) infection.

N Engl J Med. 2005 Dec 22;353(25):2667-72.

# Dumb and dumber!

- 1997 Hong Kong
- H5 isolates sensitive
  
- China amantadine to chickens!
- Now all H5 are resistant
  
- Concern re Tamiflu etc
- Generic, cheap and chickens are important

# Insurance

- Pandemic may not occur
- We need to be prepared
- Really insurance
  - (hope we do not use!)
  
- Benefits for future
  - Vaccines
  - Drugs for preventing and treating infections

# What if Worse case happens?

- 50% infected, 5% mortality, 20% very sick
- Health system will NOT cope
  - Hospital now stretched
  - Canberra with 350,000 pop,
  - then 70,000 for hospital and 17,000 deaths
  - We have 1000 beds (on a very good day!)
  - Half staff away
  - Even if spread over 6 months then about 10,000 people per month into hospital and these people will all be sick
- For most it will be look after yourself and family
- Panic will be a probelm

# How risky to people

- Millions of birds
- Millions of people already
- No reassortment yet
- If reassortment likely to be less lethal



# conclusion

- H5N1 pandemic is not inevitable
- But we need insurance
- Preparation
  - re vaccine, drugs and how to limit spread of infection

# Fear in Infections

- Best approach is information
- Adequate understanding

# Leadership conclusion

- Difficult
- Has to be someone
- If likely nation-wide epidemic,
- then Federal Health Minister and Prime Minister
  - (or Chief Health Officer)
- Issues other than health will be vital as well