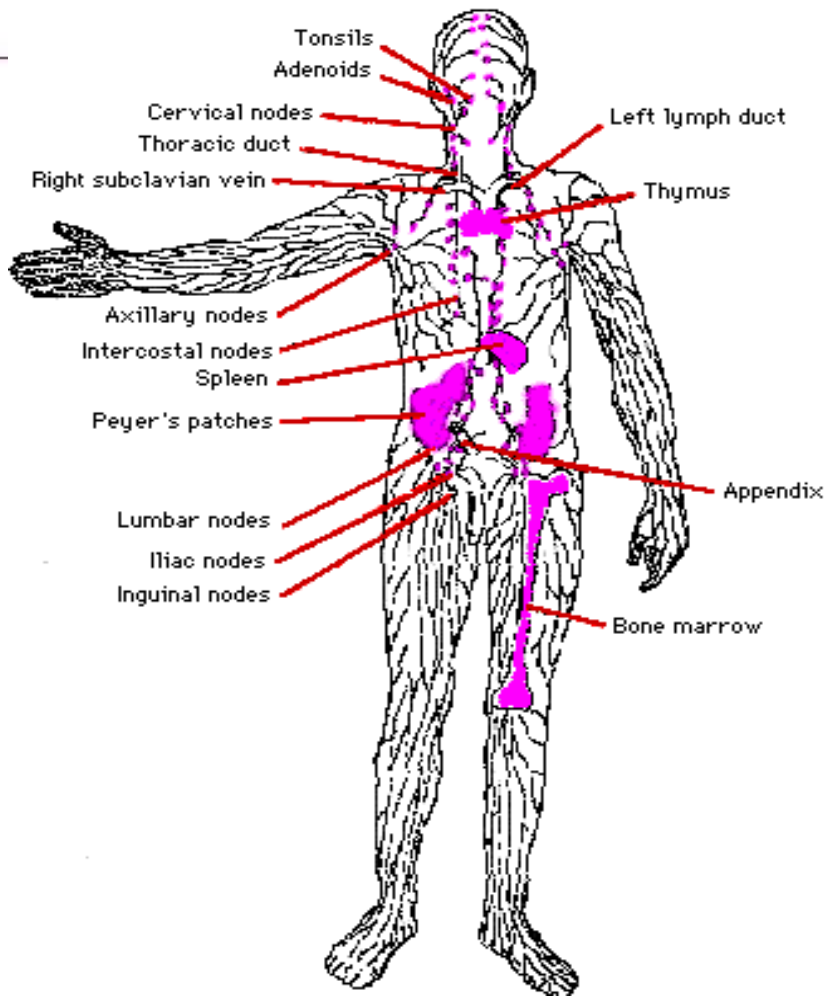


H IV and Influenza virus

Infections & Immunity Board

Infections and Immunity Board



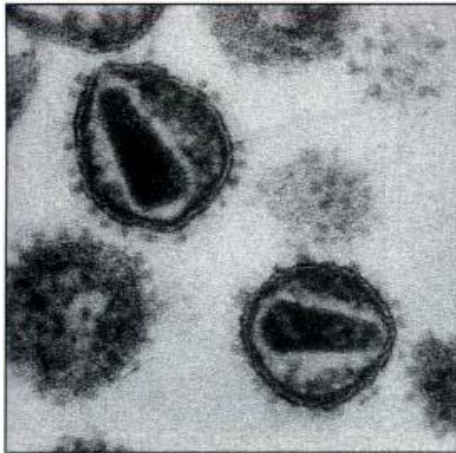
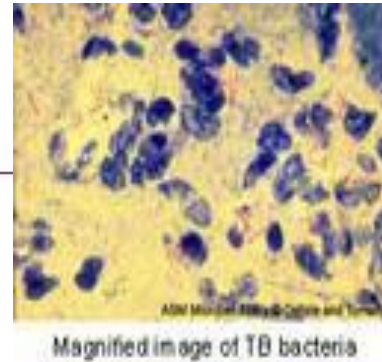
Areas covered include:

- Infections
 - UK and tropical
- Immunology – understanding the body's immune system
- Vaccines and drugs

Annual investment in the IIB Portfolio is £55m

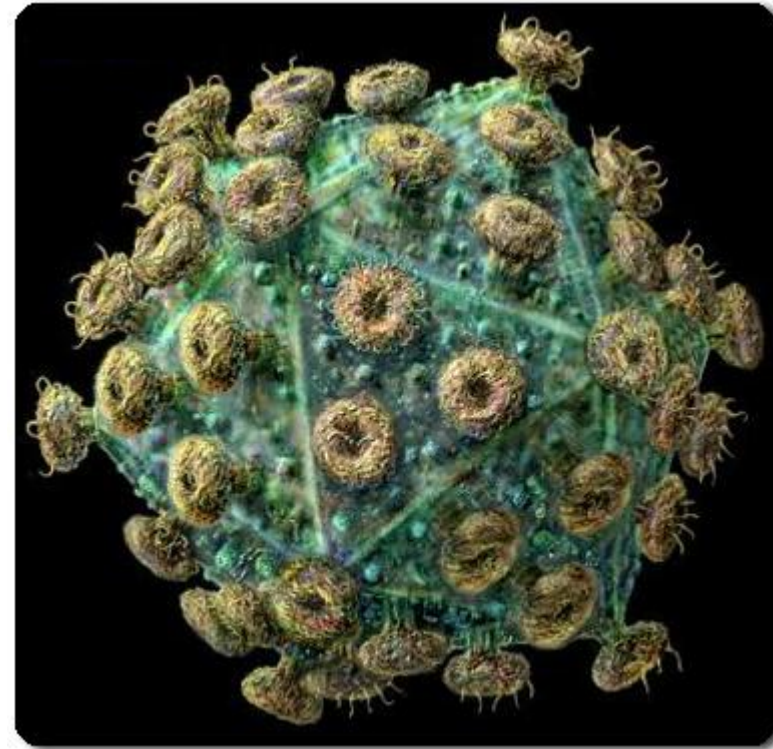
Infections

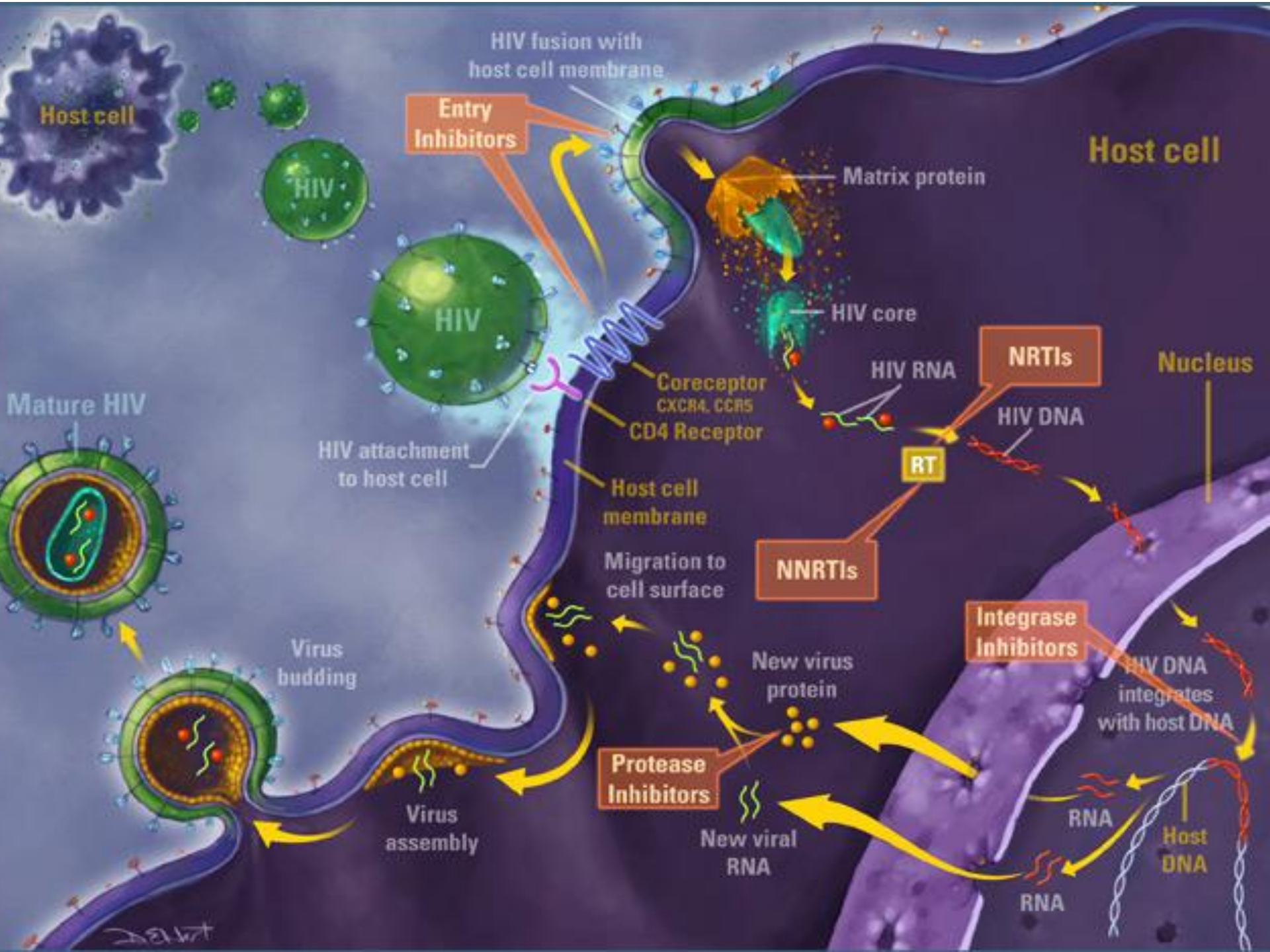
- Viruses e.g. HIV
- Bacteria e.g. TB
- Parasites e.g. Malaria
- Antibiotic Resistance

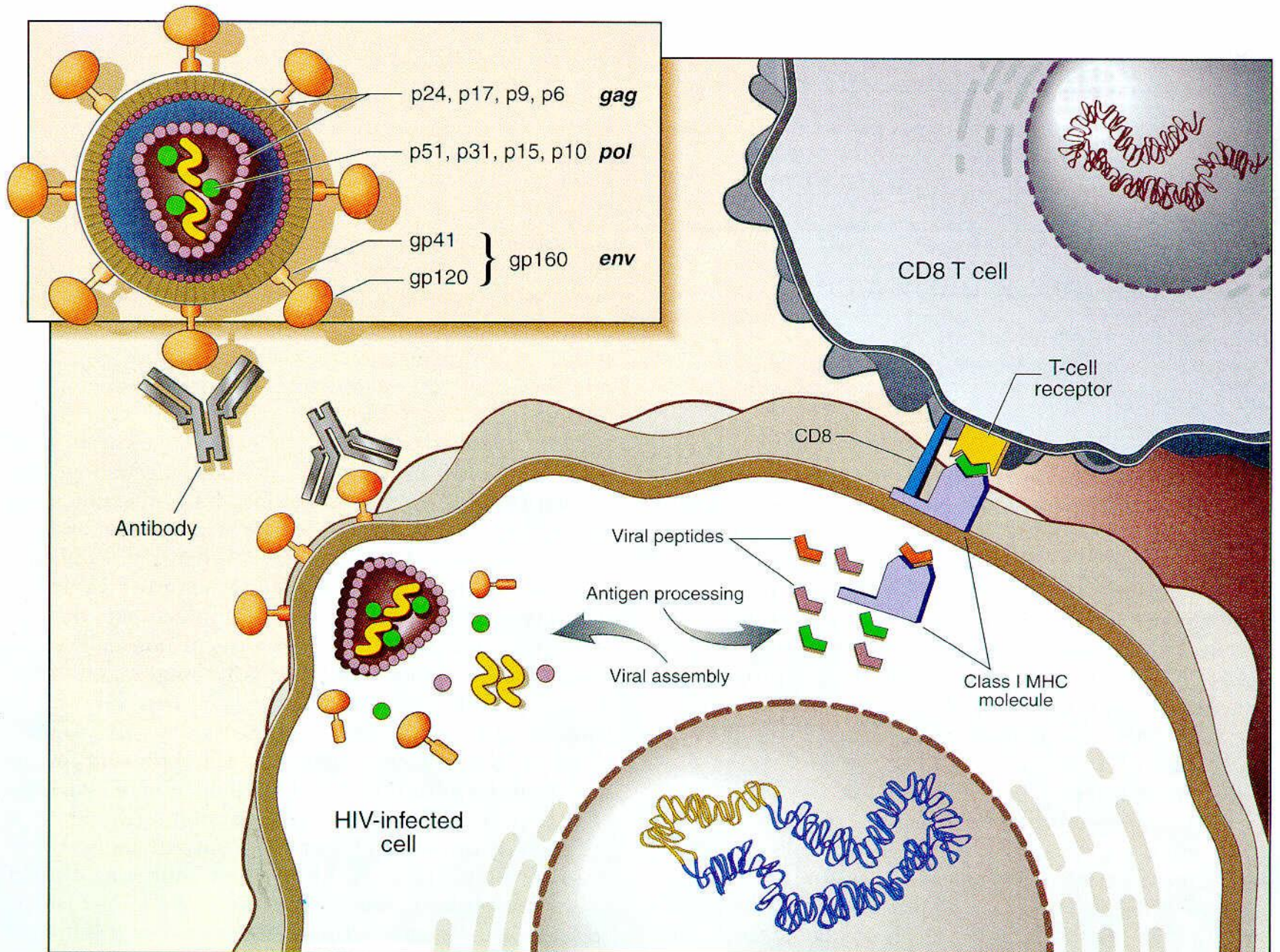


Understanding HIV

- **Population studies**
- **Cell and molecular studies**
- **Immunology**
- **Treatment - Drugs**
- **Prevention (Vaccines, virucides)**
- **Trials**







HIV Vaccine Discovery



- HIV has evolved to damage the immune response
- Poor immune response helps virus to escape by mutation
- Unique problems for vaccine design
- Main disease burden is in developing countries
- UK leads in HIV vaccines for Africa
- Huge cost implications for funders
- International cooperation- “The Vaccine Enterprise”

Overseas Research

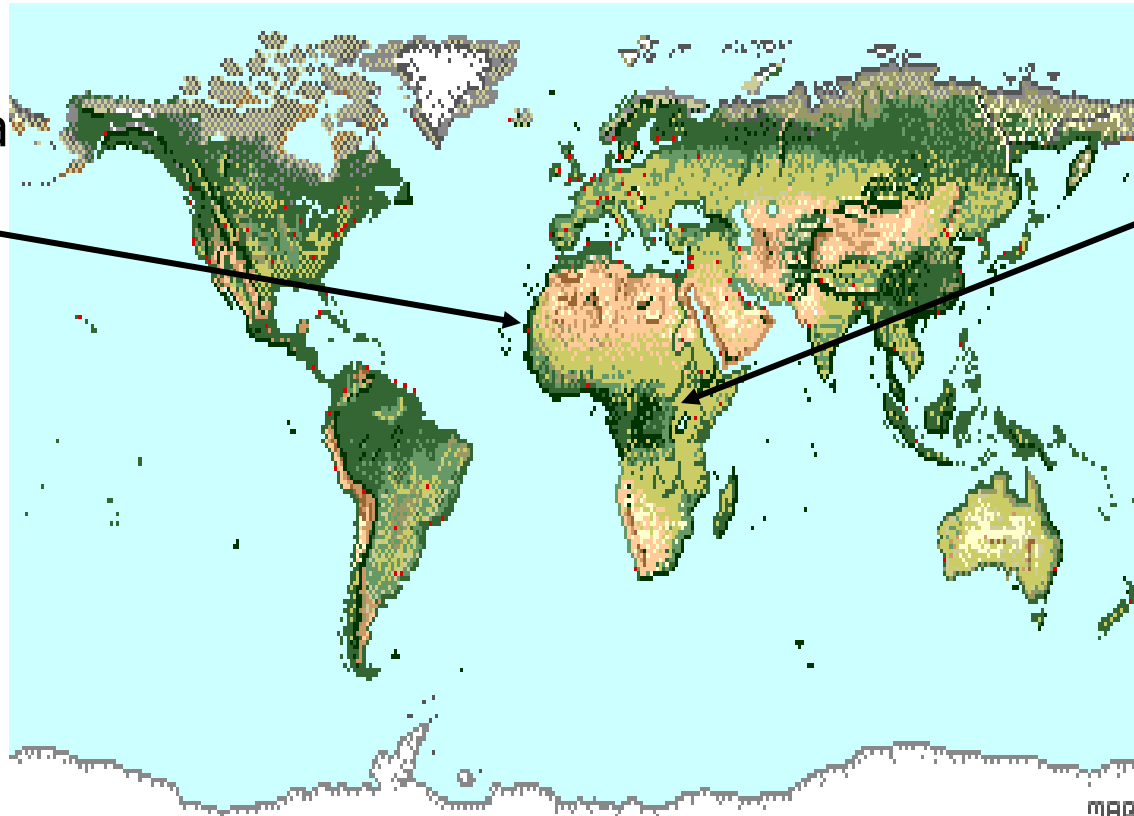
- Major infectious diseases Malaria, RB, HIV
Pneumonia, Gut infections
- Lack of infrastructure
- Social conditions
 - Poverty
 - Stigmatisation
 - Traditional medicine



Overseas Research

The Gambia
MRC Unit

Malaria
TB
HIV
Measles
Pneumonia
Meningitis
Hepatitis



Uganda
MRC Unit

HIV

Looking Ahead Malaria, HIV, TB

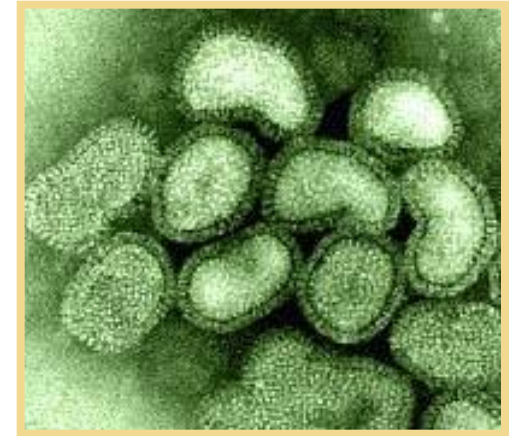


- Improved drugs to treat people already infected
- Prevention by Vaccination
- Vaccines can control and eradicate infections
- Vaccines for Malaria, HIV TB complex and expensive
- Vaccines for Emerging Infections– Avian Flu, SARS

[Click Here → HIV Animation](#)

Influenza Virus

- Family Orthomyxoviridae
- Three main types
 - Type A
 - Multiple species
 - Type B
 - Humans
 - Type C
 - Humans and swine



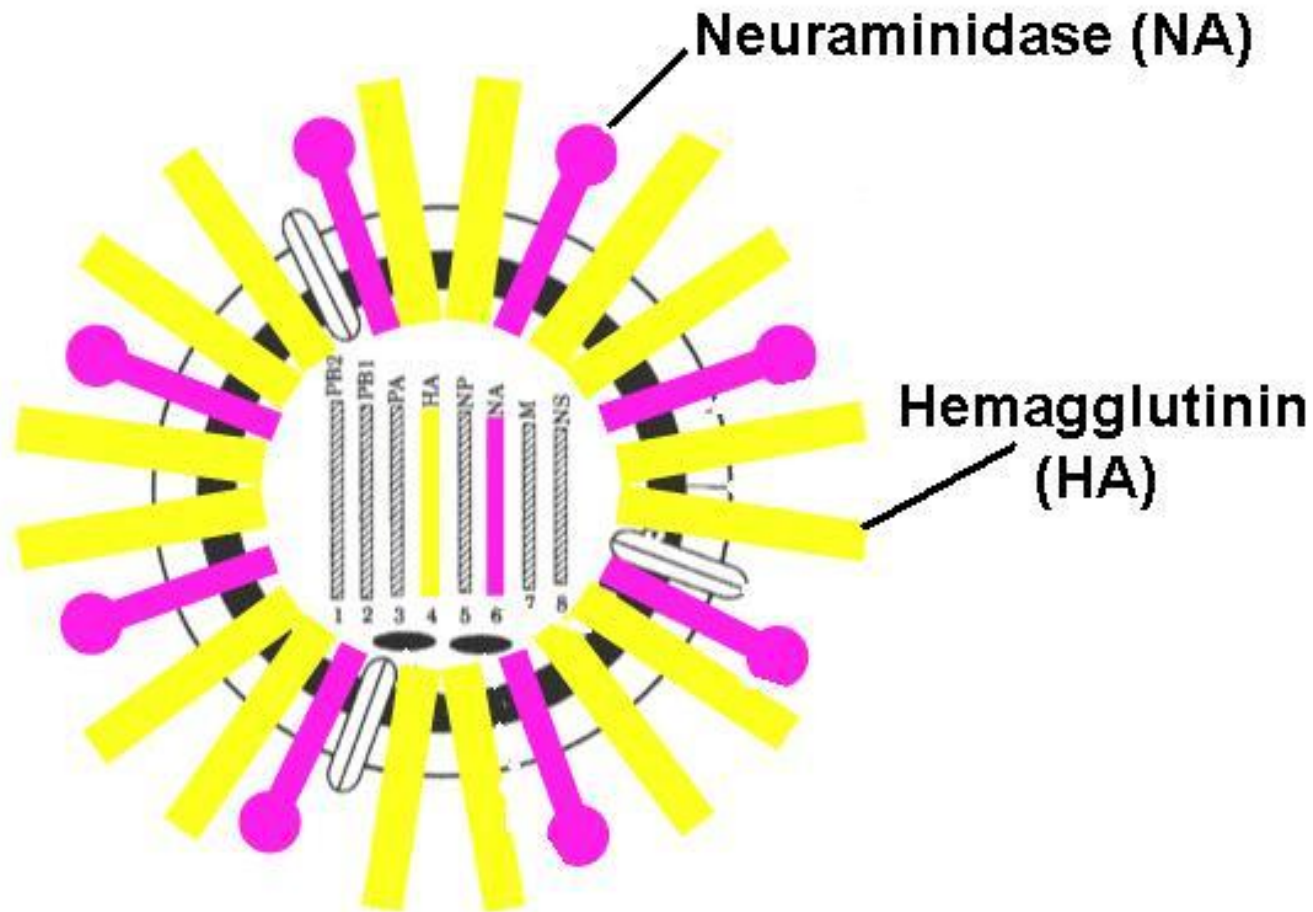
Influenza A

- Multiple species
 - Humans
 - Avian Influenza
- Most virulent group
- Classification by surface antigens into subtypes
 - Hemagglutinin (H or HA)
 - Neuraminidase (N or NA)

Surface Antigens and Subtypes

- 15 HA and 9 NA for influenza A
 - All in aquatic birds
- Hemagglutinin (HA)
 - Function: Sites for attachment to infect host cells
- Neuraminidase (NA)
 - Function: Remove neuraminic acid from mucin and release from cell

Influenza A



Influenza B

- Mostly humans
- Common
- Less severe than A
- Epidemics occur less often than A
- Human seasonal vaccine
 - Two strains of type A
 - One strain of type B

Influenza C

- Humans and swine
- Different pattern of surface proteins
- Rare
 - Mild to no symptoms
- By age 15, most have antibodies

Clinical Signs

- Incubation period: 3-14 days
- Birds found dead
- Drop in egg production
- Neurological signs
- Depression, anorexia, ruffled feathers
- Combs swollen, cyanotic
- Conjunctivitis and respiratory signs

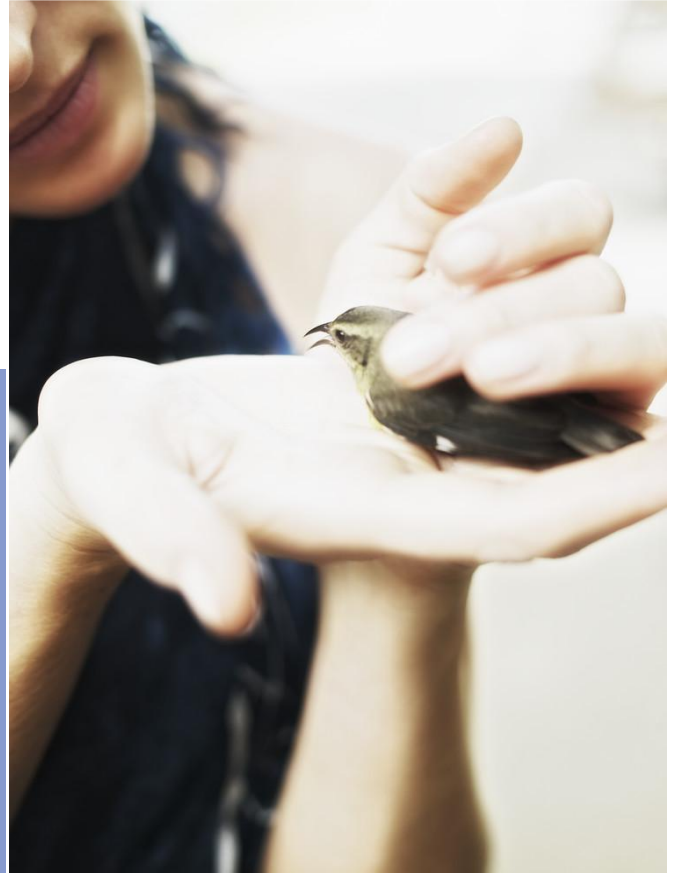


Understanding Bird Flu and the Influenza Virus

- 3 types of the influenza virus: A, B and C reflect differences in the M protein on the envelope that contains the virus
- 'A' influenza viruses cause human and bird flu outbreaks
 - contain 8-segment RNA strand
 - segments break apart during replication to mix and reassort
 - potential for constant evolution is built in
 - sub-typed based on activity in envelope's glycoproteins:
 - 1] hemagglutinin activity (H): 16 known varieties
 - 2] neuraminidase activity (N): 9 known varieties

Bird Flu and Human Flu Have a Complex and Inter-related Story

3 influenza A viruses associated with 20th century human pandemics all have genetic components originally housed in viruses in birds



- 1918 H1N1 virus killed 20 to 40 million people worldwide
- 1957 H2N2 and 1968 H3N2 viruses each responsible for more than 1 million deaths
- Now, in 2005, all eyes are focused on H5N1 — bird flu

The Influenza A Virus Appears Most In Wild Bird Populations

- Spreads rapidly through exchange of mucus or feces, without creating sickness or death in these species
- Once transferred to domestic birds (chickens, ducks and turkeys), spreads explosively — is frequently lethal
- Virus mutates rapidly in large groups of closely contained birds

– Has ability to jump to other species, such as pigs

Secondary carriers become mixing pots for more varieties, increasing chances that other mammals, including humans, will become vulnerable.

Bird Flu in Humans

- H5N1 first infected a human population in Hong Kong in 1997
 - 18 documented cases, 6 deaths
 - reappeared in 2 cases, causing 1 death in 2003
 - soon broke out in Vietnam, Thailand and Cambodia
- As of June 2005: 100 documented human cases
 - 54 percent mortality rate
 - transmission is result of direct contact with infected poultry
- What constitutes a pandemic?
 - 1] highly virulent organism
 - 2] lack of human immunity to the organism
 - 3] ability to easily transmit from human to human

H5N1 has the first two, but not the third (at least not yet)