

**25 Years of AIDS –  
Reflecting Back and Looking Forward**

# The Scientific Response

**Anthony S. Fauci, M.D.**  
Director

National Institute of Allergy and Infectious Diseases

National Institutes of Health  
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CENTERS FOR DISEASE CONTROL  
**MNWR**  
MORBIDITY AND MORTALITY WEEKLY REPORT

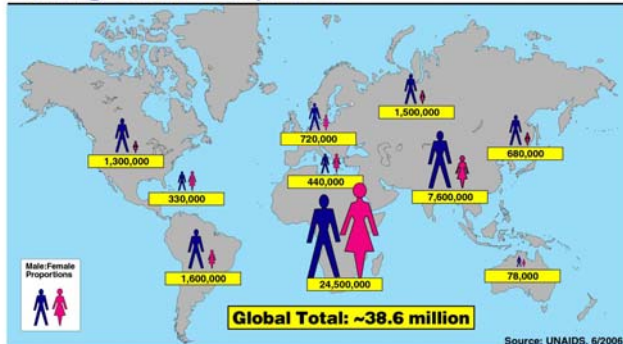
June 5, 1981  
**Pneumocystis Pneumonia –  
Los Angeles**

In the period October 1980 – May 1981, 5 young men, all active homosexuals, were treated for biopsy-confirmed *Pneumocystis carinii* pneumonia at 3 different hospitals in Los Angeles, California. Two of the patients died. All 5 patients had laboratory-confirmed previous or current cytomegalovirus (CMV) infection, and cardiac mucosal infection. Case reports of these patients follow.

July 4, 1981  
**Kaposi's Sarcoma and  
Pneumocystis Pneumonia Among  
Homosexual Men –  
New York City and California**

During the past 30 months, Kaposi's sarcoma (KS), an uncommonly reported malignancy in the United States, has been diagnosed in 26 homosexual men (20 in New York City (NYC), 6 in California). The 20 patients range in age from 24–51 years (mean 39 years). Eight of these patients died (7 in NYC, 1 in California) – all 8 within 24 months after KS was diagnosed.

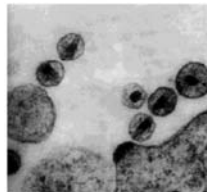
## Adults and Children Estimated to be Living with HIV, 2005



201,110 HIV-Related Papers in PubMed Database as of August 14, 2006

## Advances in AIDS Research, 1981-2006

- Etiology
- Diagnosis
- Molecular Virology and Epidemiology
- Pathogenesis
- Natural History
- Treatment
- Prevention
- Vaccine Development



## Discovery of HIV as the Cause of AIDS, 1983-84

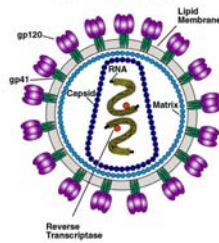


## Immediate Importance of Blood Test for HIV

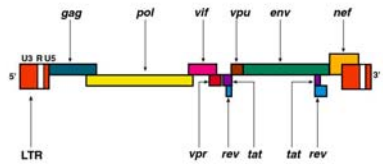
- Protect blood supply
- Diagnosis, especially early in disease
- Demonstration of extent of asymptomatic disease
- Epidemiological and natural history studies

## The Human Immunodeficiency Virus (HIV)

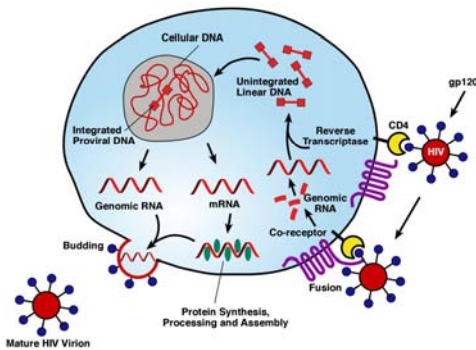
### Organization of the HIV-1 Virion



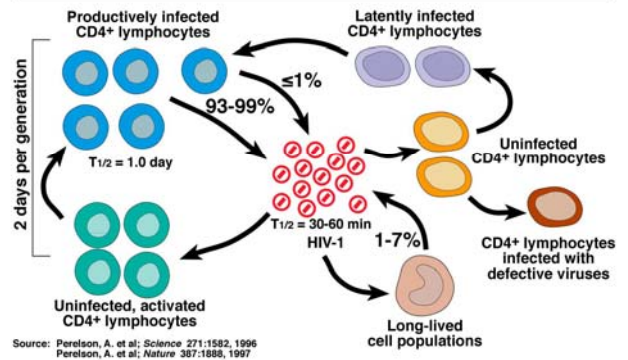
### HIV Genomic Map



## The Replication Cycle of HIV

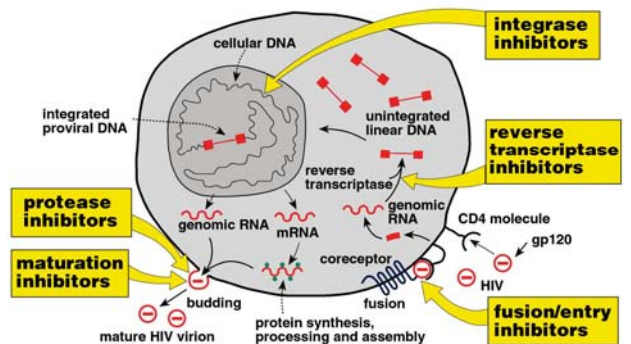


## Dynamics of HIV Infection *In Vivo*



## Treatment of the HIV-Infected Individual

## Targets for Antiretroviral Drugs



## FDA-Approved Antiretroviral Drugs

### NRTI

- Abacavir
- Didanosine
- Emtricitabine
- Lamivudine
- Stavudine
- Zidovudine
- Zalcitabine
- Tenofovir

### NNRTI

- Delavirdine
- Efavirenz
- Nevirapine

### Fusion Inhibitor

- Enfuvirtide (T-20)

### PI

- Amprenavir
- Atazanavir
- Fosamprenavir
- Indinavir
- Lopinavir
- Nelfinavir
- Ritonavir
- Saquinavir
- Tipranavir
- Darunavir (TMC114)

### Combinations

- 5 available, combining 2 or 3 drugs  
– e.g. Atripla: efavirenz + emtricitabine + tenofovir

## AIDS Drugs Have Saved 3 Million Years of Life in the United States

July 1, 2006  
Volume 194

The Journal of  
Infectious  
Diseases

### The Survival Benefits of AIDS Treatment in the United States

RP Walensky et al.

## Global Access to Antiretroviral Drugs in Low and Middle Income Countries is Improving

12/2002: 300,000 people on ARVs

12/2005: ~1.3 million people on ARVs

- In 2005, 250,000-350,000 deaths were averted because of recent treatment scale up.
- However, only 1 in 5 people in need of ARVs in low- and middle-income countries are receiving them.

Source: WHO, 3/2006

## HIV Prevention Research

- Education and behavior modification
- Interruption of transmission from mother to child
- Treatment/prevention of drug/alcohol abuse
- Clean syringes (i.e. "needle exchange" programs)
- Circumcision
- Condoms, other barrier methods
- Topical microbicides
- Treatment of other sexually transmitted diseases
- Prophylactic antiretroviral therapy
- Vaccination

## Looking Forward: Key Scientific Challenges

- Persistence of viral reservoir
- Early events in HIV infection
- New targets for drugs
- Topical microbicides
- Vaccines

## Topical Microbicides

- Most HIV infections are spread by unprotected sex
- Current methods are male controlled and contraceptive
- Women have no means to protect themselves if their partners do not use male condoms or allow female condoms to be used
- Abstinence and being faithful are not likely to protect married women or those who are sexually abused

## **A Safe and Effective HIV Vaccine**

- Critical to the effective control of HIV globally.
- The most important and difficult scientific challenge in AIDS research.



## **Confronting AIDS in the 21st Century**



**History will judge us as a global community by what we will do in the next 25 years as much as by what we have accomplished in the first 25 years.**