

# Prokaryotic Biology

## **VIRAL STDs, HIV-1 AND AIDS**

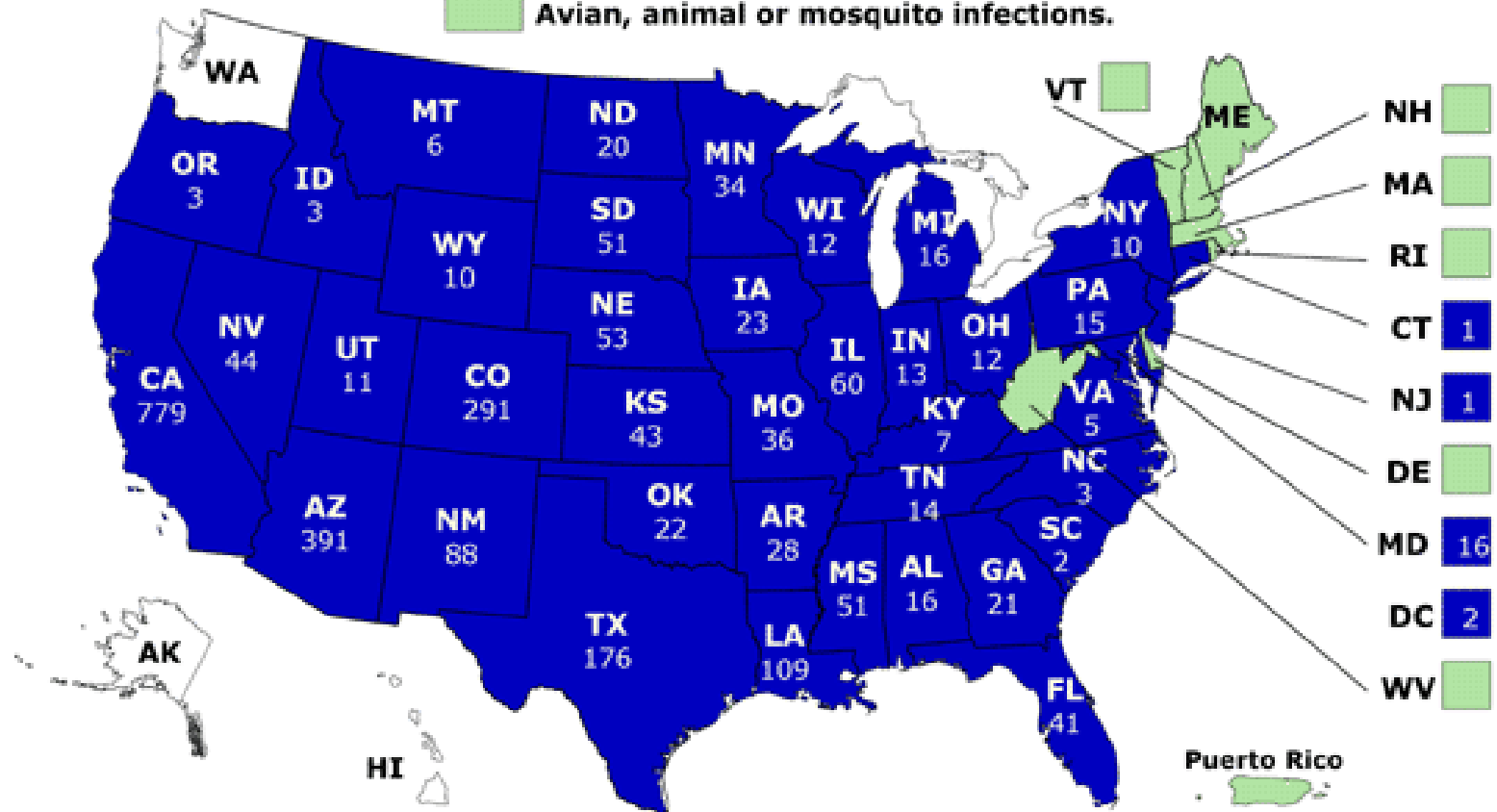
# Prokaryotic Biology FROM THE CDC



Indicates human disease case(s).  
 Avian, animal or mosquito infections.



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 Avian, animal or mosquito infections.



# VIRAL STDs, HIV-1 AND AIDS

## VIRAL STDs & CONTACT VIRAL DISEASES

### A. GENITAL HERPES & COLD SORES

1. HERPES SIMPLEX VIRUS-2 (HHV-2)
2. SYMPTOMS
3. LATENCY AND RECURRENT INFECTIONS
4. TREATMENT--ACYCLOVIR (ZOVIRAX)

### B. WARTS & CONDYLOMA (CONDYLOMATA ACUMINATA)

1. PAPILLOMAVIRUS INFECTION
2. HPV-16 (OTHERS) ASSOCIATED WITH CERVICAL CARCINOMA
3. VIRAL PROTEINS "TRANSFORM" CELLS





# **VIRAL STDs, HIV-1 AND AIDS**

## **HIV and RETROVIRUSES**

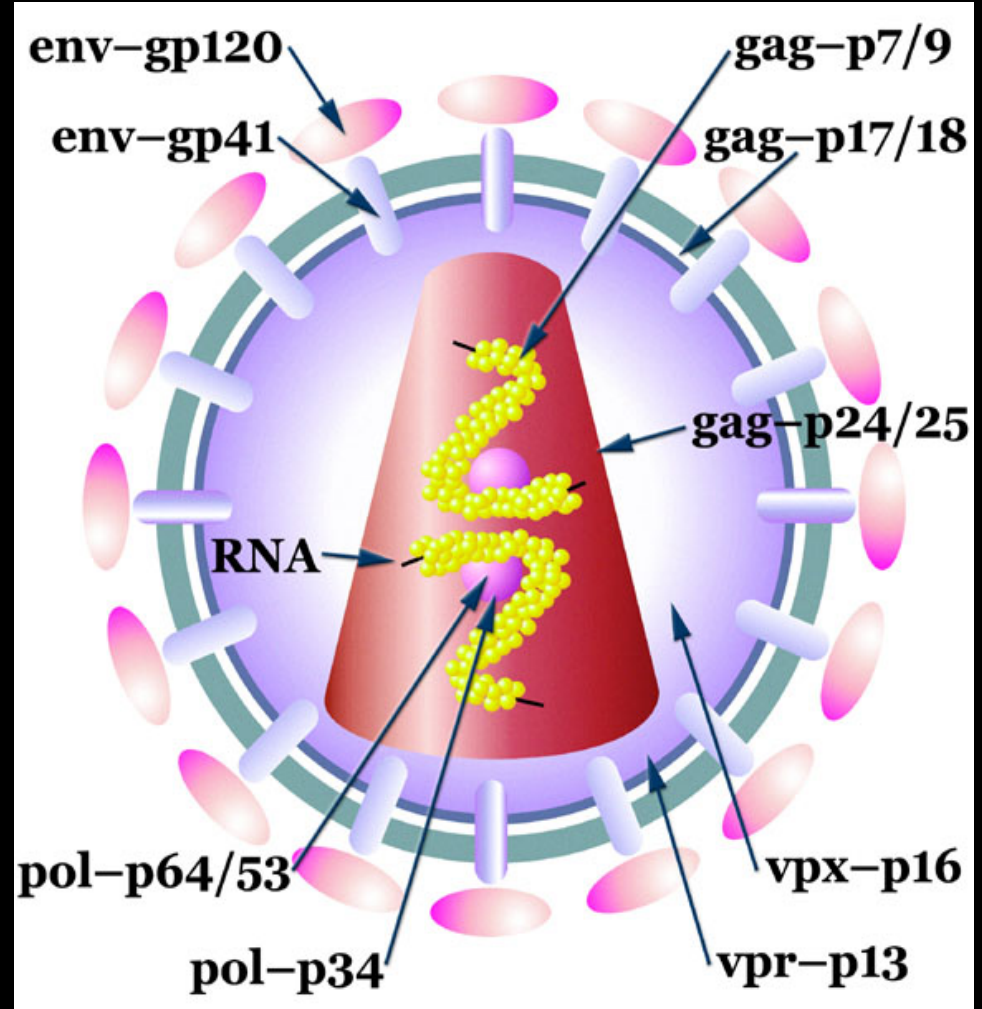
### **A. RETROVIRUSES--RETROVIRIDAE**

#### **1. MORPHOLOGY & LIFE CYCLE**

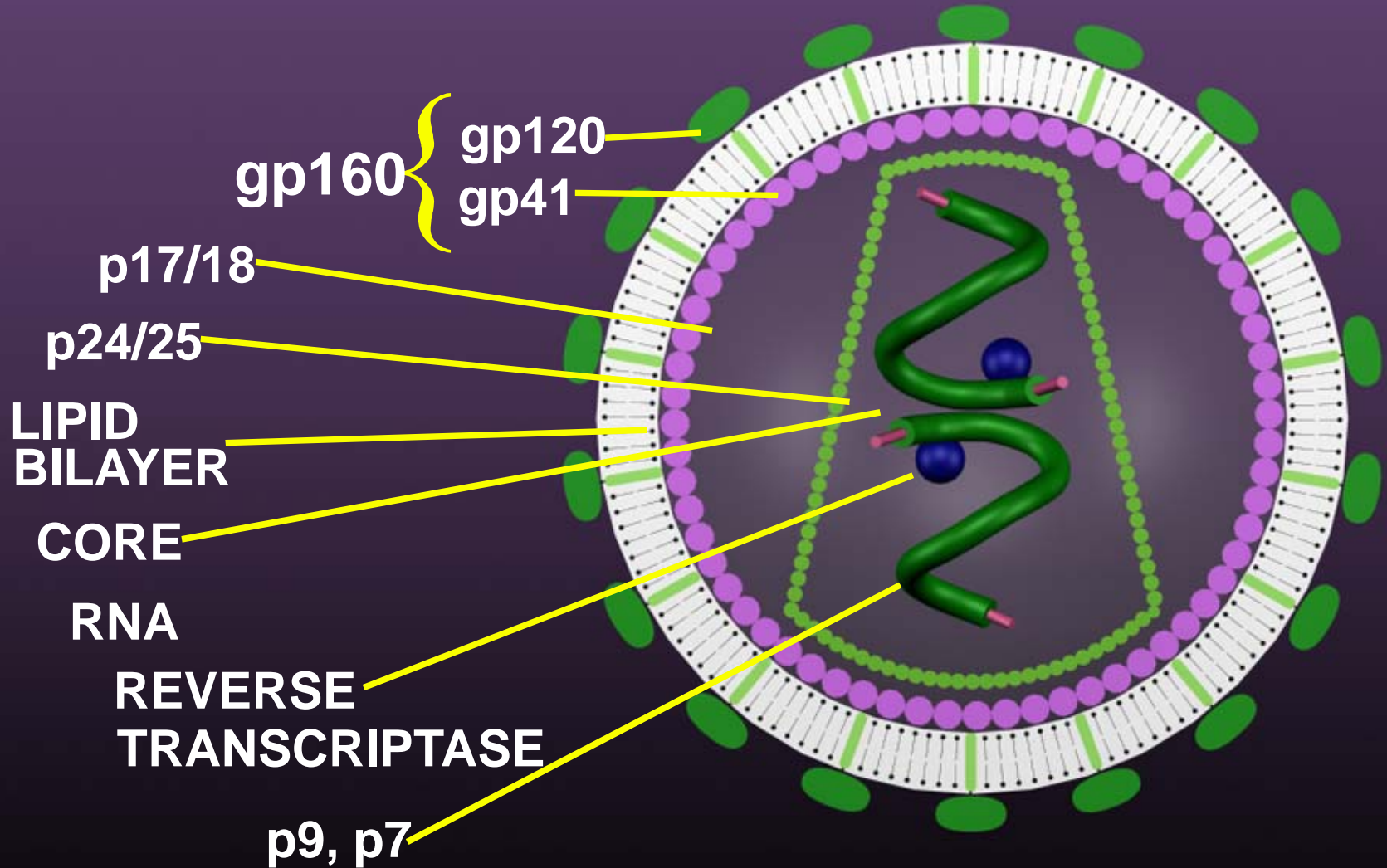
#### **2. CLASSIFICATION - GENERA**

- a.  $\alpha$  - MAMMALIAN C TYPE VIRUS (MuLV)**
- b.  $\beta$  - MAMMALIAN B TYPE VIRUS (MMTV)**
- c.  $\gamma$  - TYPE D VIRUS (M-PMV, SRV)**
- d.  $\delta$  - ALV-RELATED VIRUS (ALV, RSV)**
- e.  $\epsilon$  - PTLV-BLV (PTLV-1, THE CAUSE OF HUMAN ATL)**
- f. LENTIVIRUS (SIV, HIV-1, HIV-2, VISNA, EIAV)**
- g. SPUMAVIRUS (HUMAN, SIMIAN, FELINE FOAMY V)**

### **B. CAUSE OF "SLOW" IMMUNOSUPPRESSIVE DISEASES**



# HIV-1 (HTLV-III/LAV-1)



# HIV-I (HTLV-III/LAV-1)

GENE	PROTEIN	FUNCTION
env	gp160 gp120 gp41	Precursor of envelope glycoprotein CD4 receptor binding Transmembrane anchorage
gag	P55 p24 p17 p15	Precursor of gag proteins Major core protein ? ?
gag-pol	p140	Protease frameshift protein
pol	p66/51 p31	Reverse transcriptase Endonuclease
sor	p23	Regulatory
3'-orf	p27	Regulatory
tat	p14	Transactivation
art/trs	p18	Antirepressor transactivator

# VIRAL STDs, HIV-1 AND AIDS

## HISTORY OF AIDS

A. FIRST APPEARANCES

B. FIRST RECOGNIZED

C. VIRAL ETIOLOGY

1. ANTIGENS PRODUCED--TESTS-ELISA &  
WESTERN BLOT

2. SEQUENCED

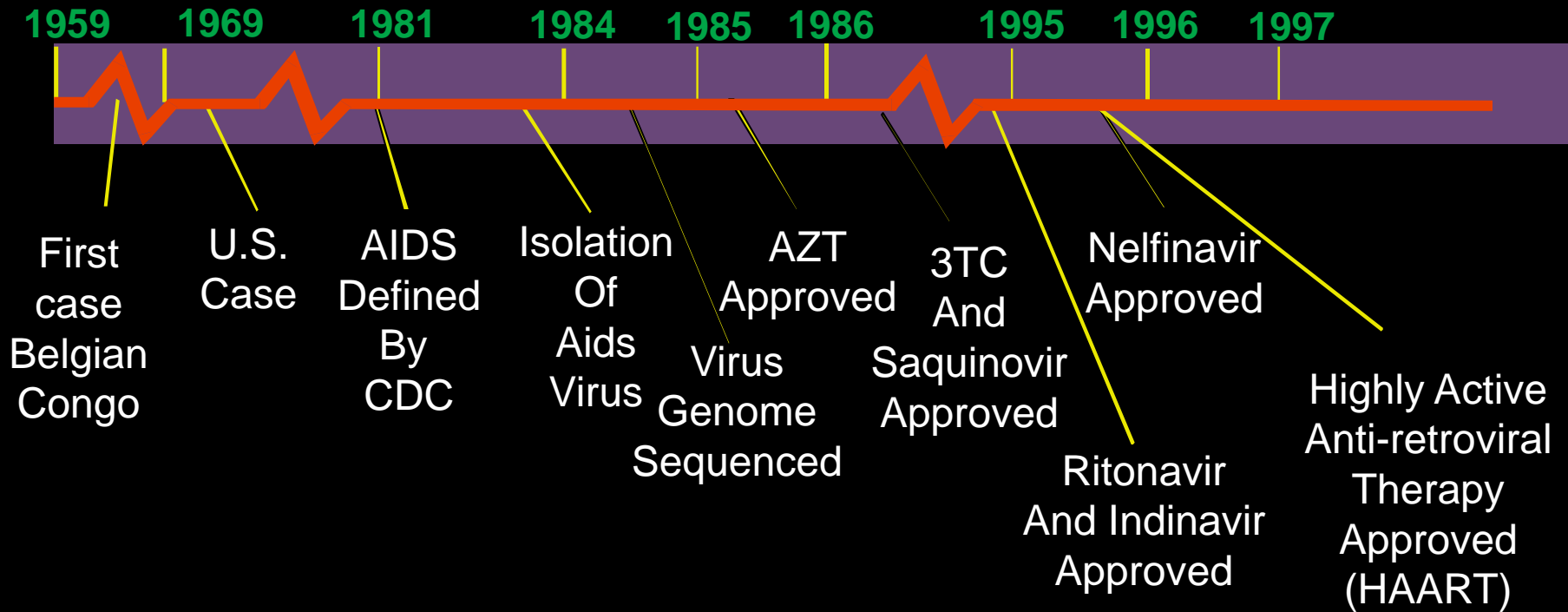
3. MOLECULAR BIOLOGY

D TREATMENTS--AZT, ddI & ddC PLUS  
PROTEASE

INHIBITORS

E. VACCINES--ABOUT 15 TRIALS UNDERWAY

# AIDS: Timeline



# VIRAL STDs, HIV-1 AND AIDS

## MOLECULAR BIOLOGY OF HIV-1

### A. RETROVIRUS LIFE CYCLE

#### 1. INFECTION & UNCOATING

2.

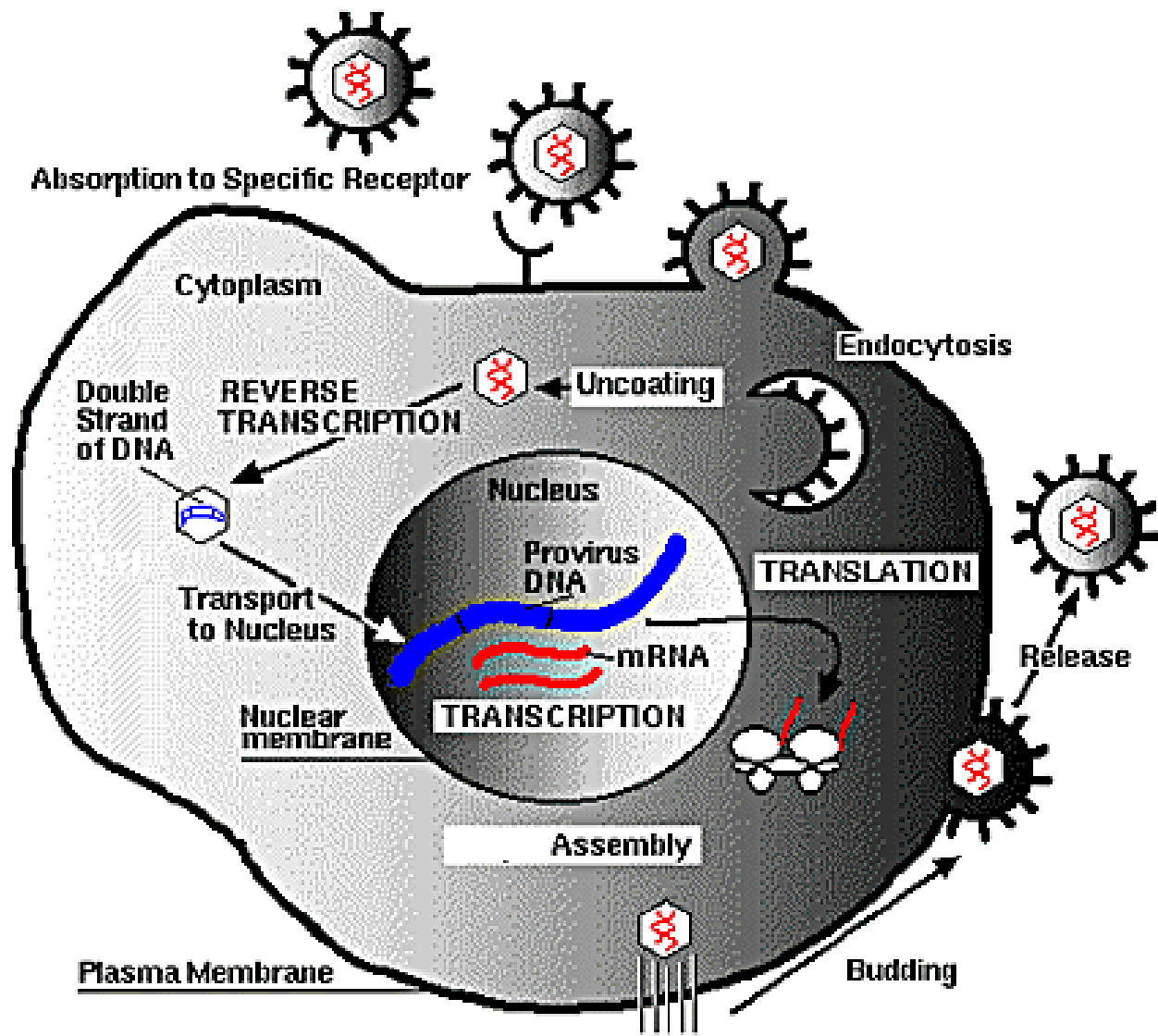
3.

4.

6.

7.

### B. THE



# Retrovirus replication

**RNA**  
**HIV**

**Viral RNA**  
**REVERSE TRANSCRIPTASE**  
**Viral DNA**

**Nucleus**

**Cellular DNA**

**TRANSCRIPTION**

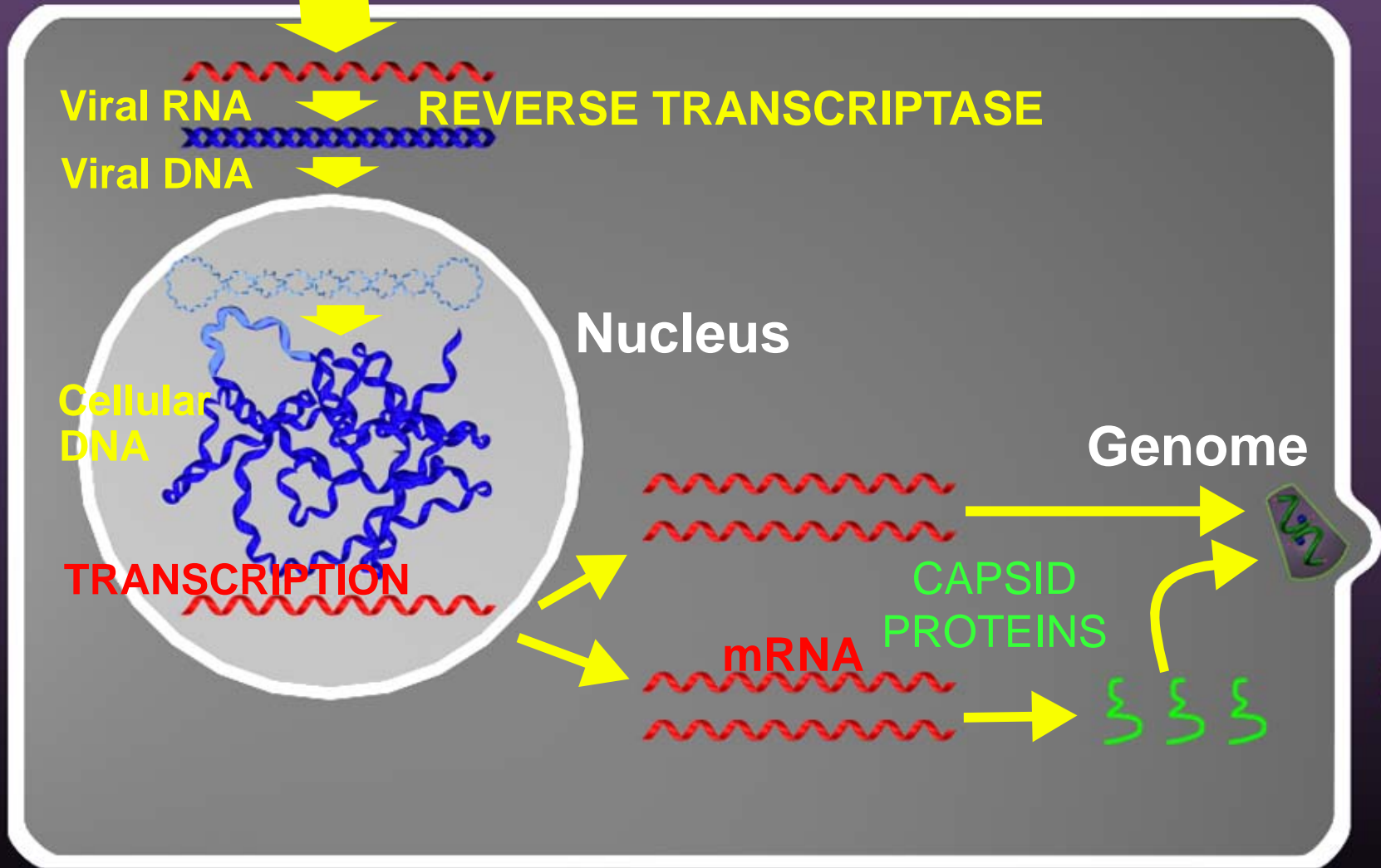
**Genome**

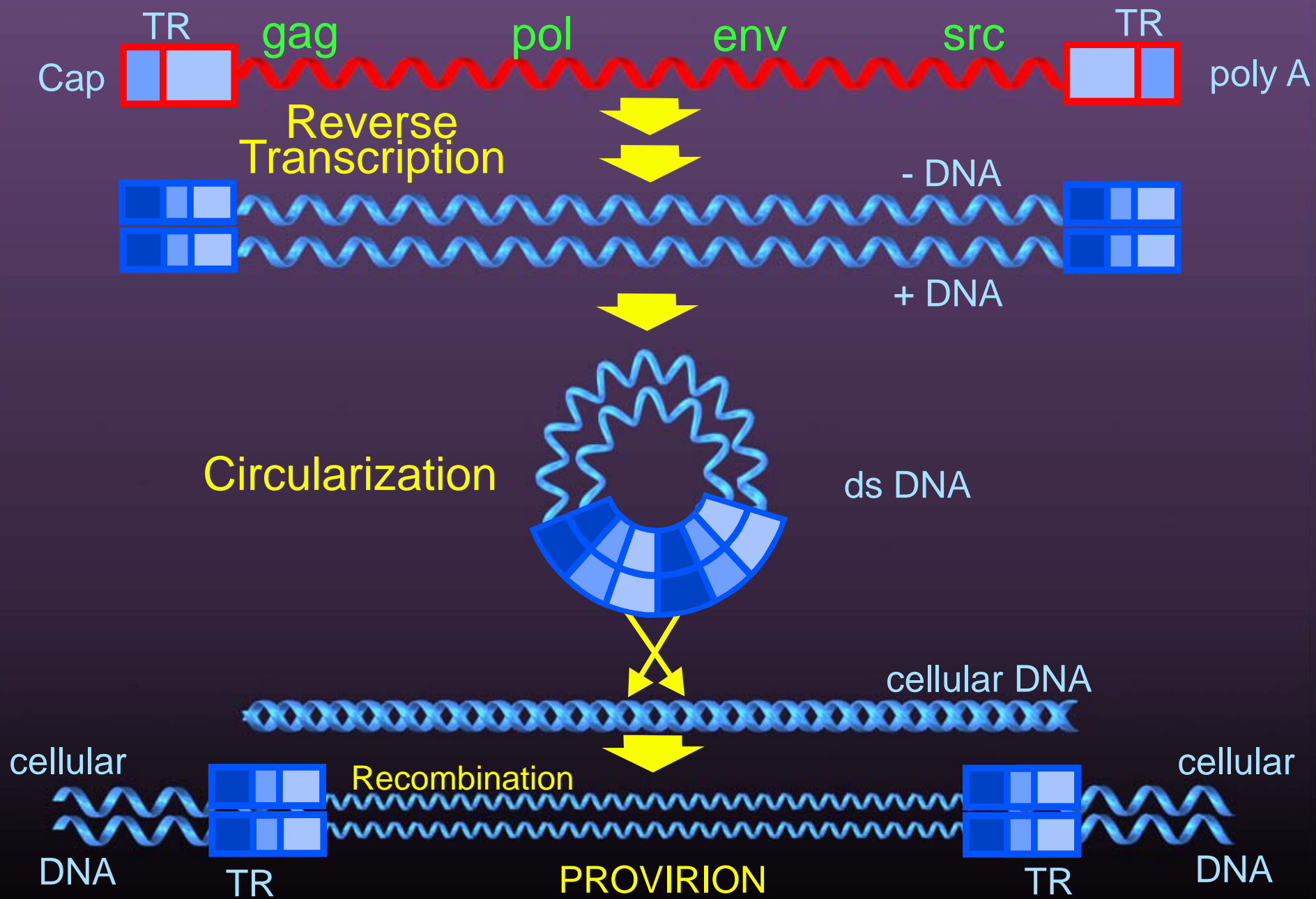
**mRNA**

**CAPSID PROTEINS**

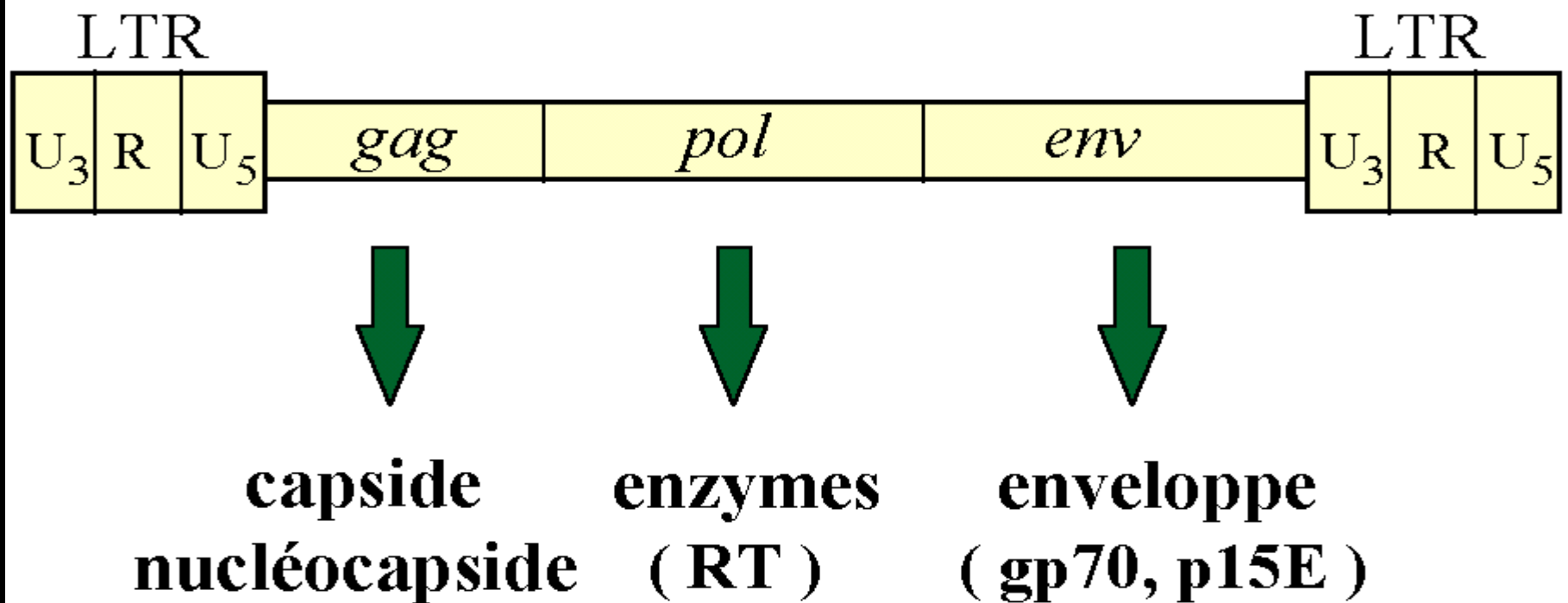
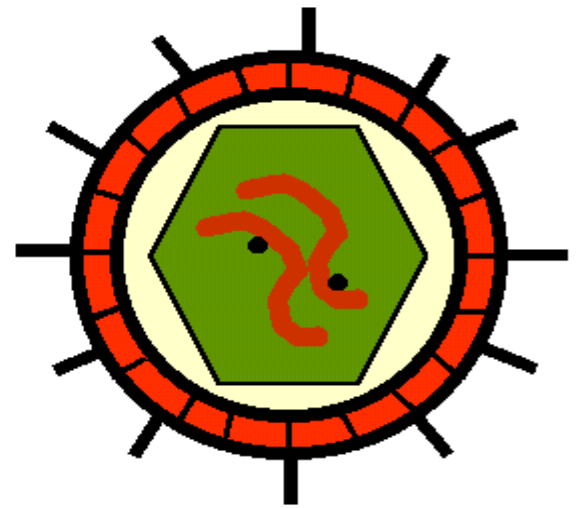


**New HIV**

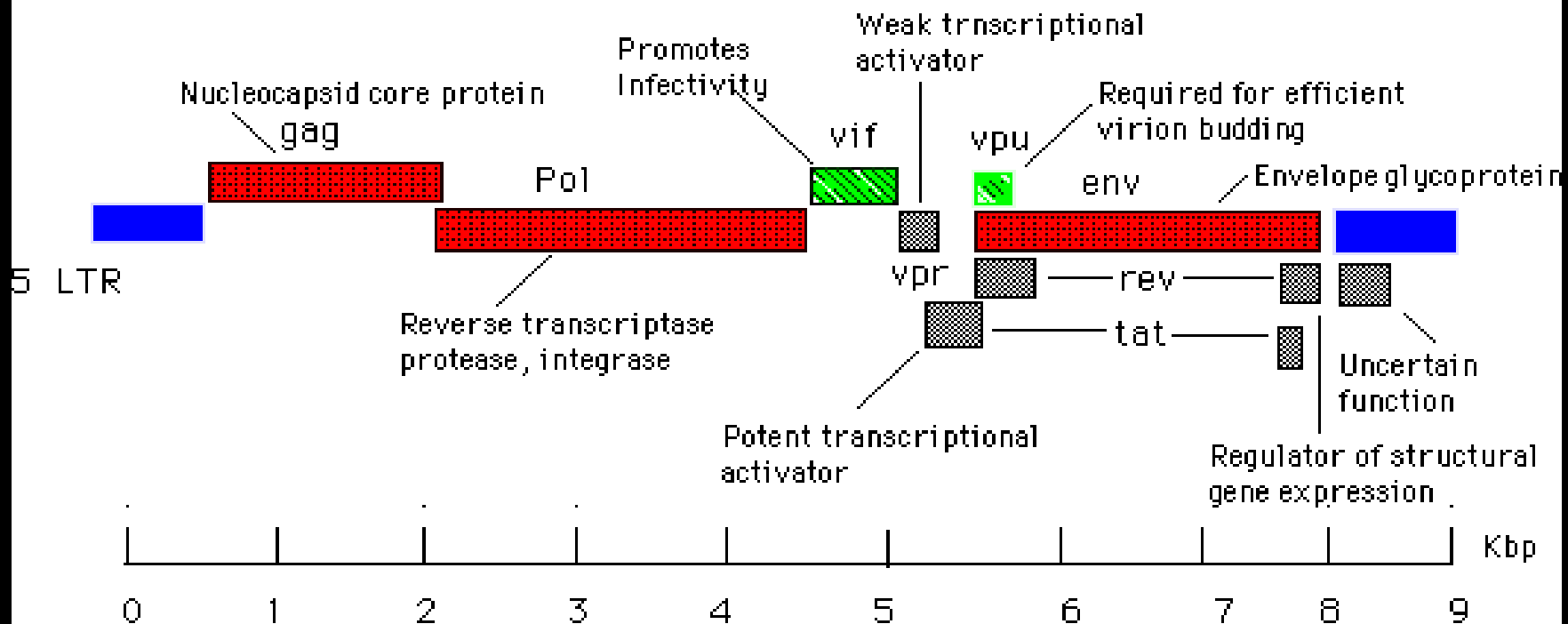




# Rétrovirus



# Genetic Organisation of HIV-1 virus



Polymerase precursor

Protease

p10

Reverse Transcriptase

p64, p51

Integrase

p32

Gag precursor

p53

Envelope precursor

gp160

Core

p17 Core  
p24

p15

p7

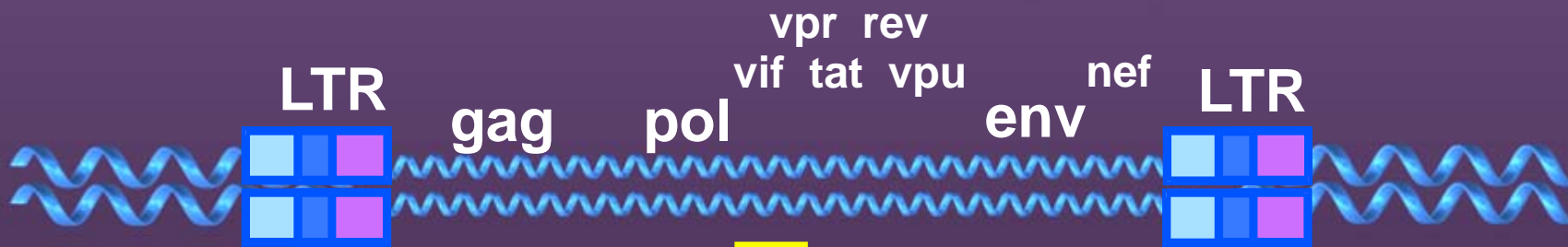
p9

Extracellular protein

gp120

Transmembrane protein

gp41



**TRANSCRIPTION**



**TRANSLATION**

gag & gag-pol proteins

**SPLICING**



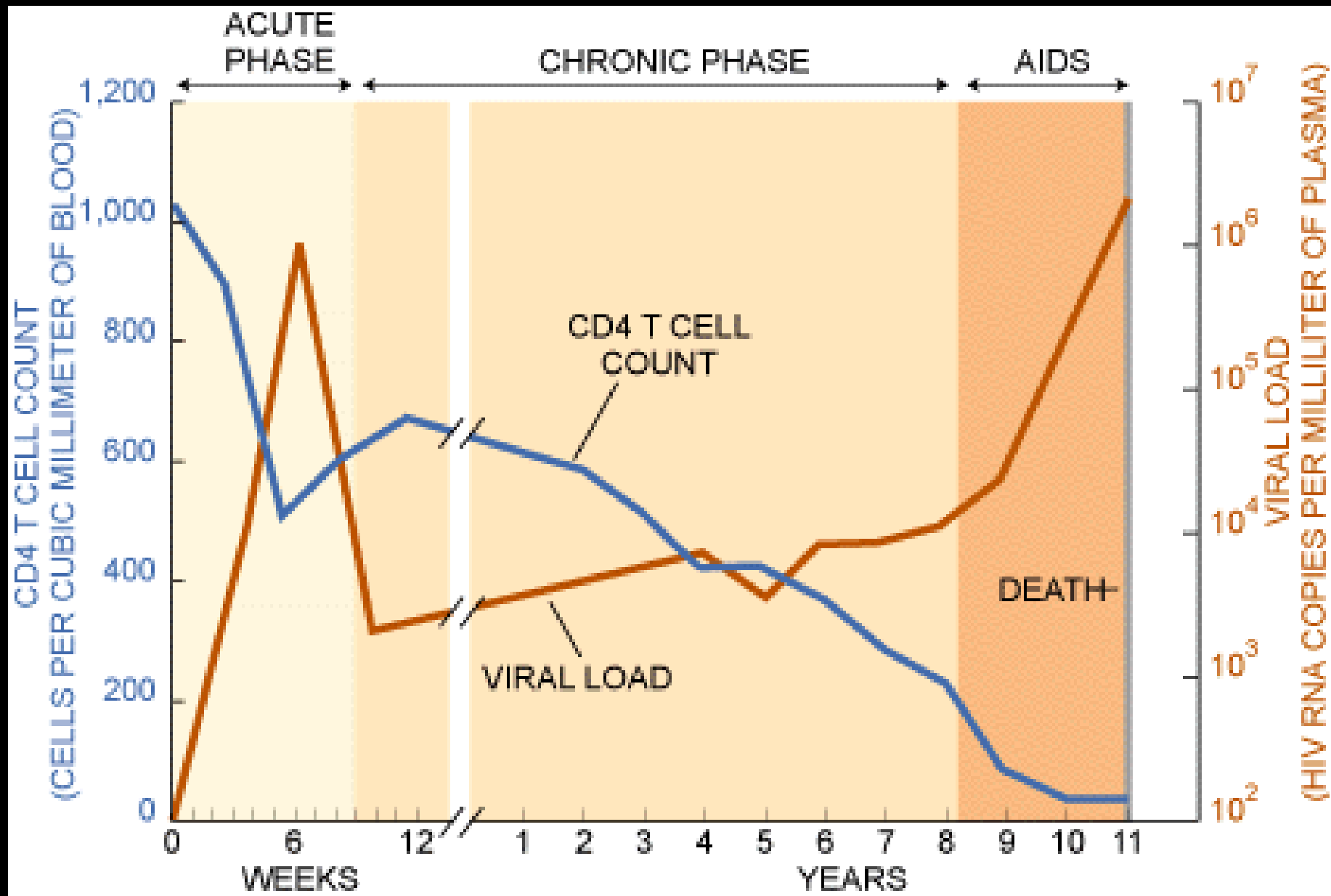
**Env**

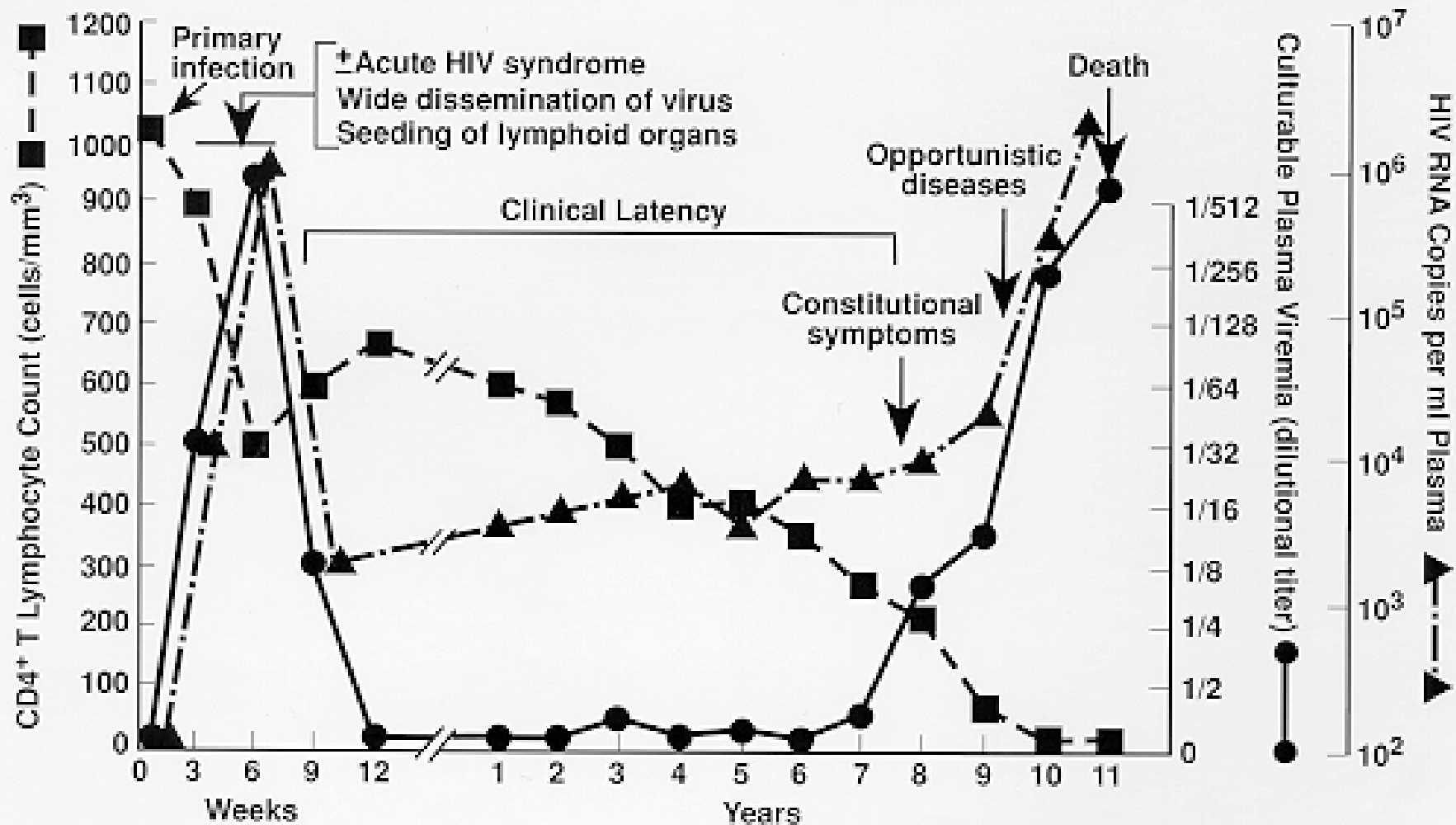
vif. tat. vpu.  
vpr. rev. nef.  
proteins

# VIRAL STDs, HIV-1 AND AIDS

## PATHOLOGY AND TRANSMISSION

- A. INITIAL INFECTION
  - B. LATENCY
  - C. ARC & AIDS
  - D. STAGING--WALTER REED & CDC
- CLASSIFICATIONS
- E. TRANSMISSION
    - 1. SEXUAL
    - 2. INTRAVENOUS DRUG USE
    - 3. BIRTH--PERINATAL





# HIV Progression

	Group 1	Group 2	Group 3	Group 4
TIME	1-12 months	1-8 years		9-15 years
	HIV antibody appears 1 to 18 weeks	immune thrombocytopenic purpura Mild anemia Mild leukopenia Some decrease in T4 Cell Count		Moderate anemia, leukopenia Low albumin Low cholesterol Decrease in T4 cell count +/- HIV antibody
	Flu-like symptoms 2 to 4 weeks			Death on average now 2 to 3 years after diagnosis
	p24 antibodies			
LABORATORY DIAGNOSIS	p24, p41 antigens appear 1 to 3 weeks (antigenemia)		Elevated p24 & beta-microglobulin	Drop in p24 antibody, rise in p24 antigen

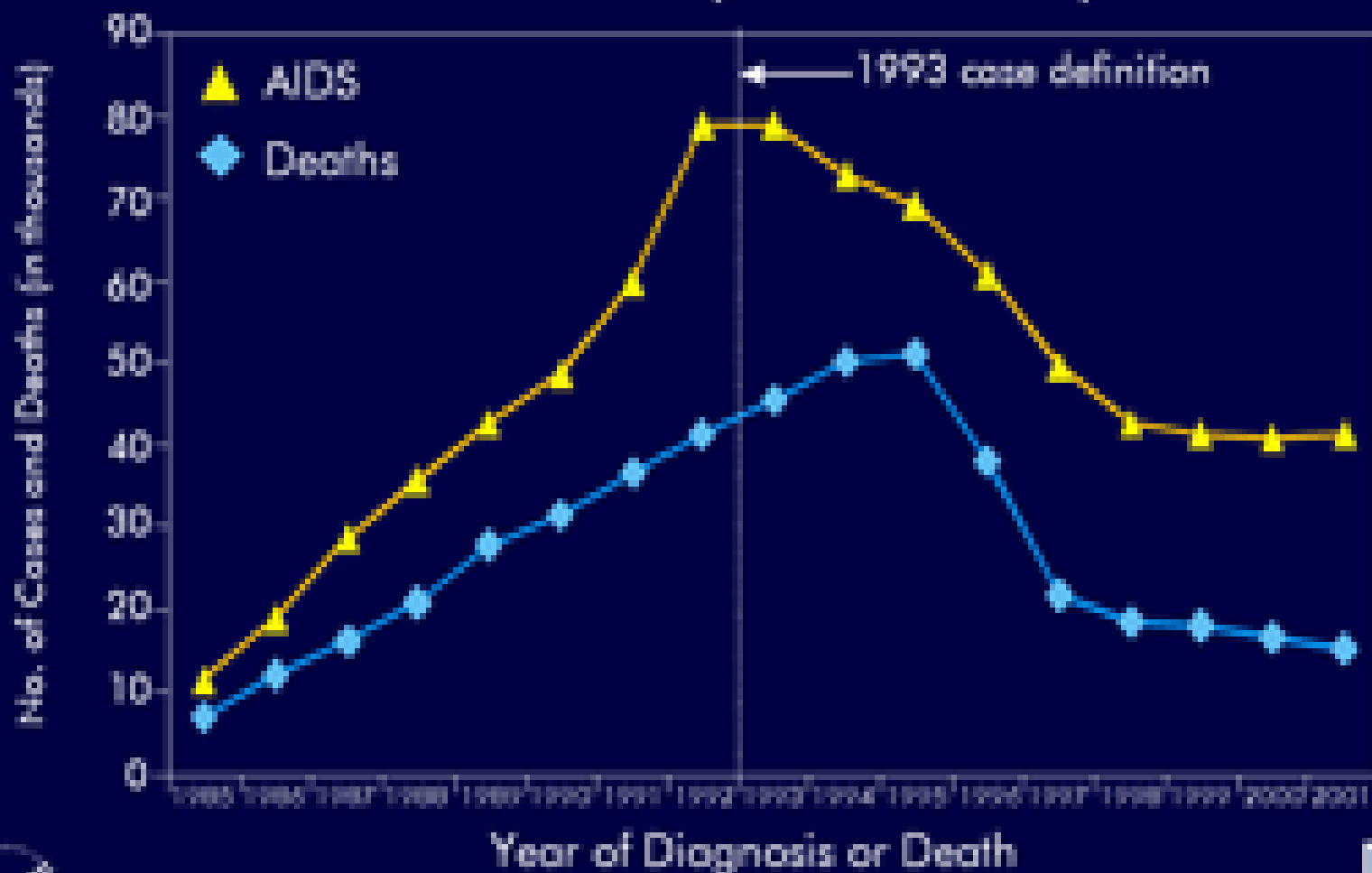
# HIV Progression

	Group 1	Group 2	Group 3		Group 4
TIME	1-12 months	1-8 years		9-15 years	Months/ years
			Mild immune dysfunction	Moderate immune dysfunction	Severe immune dysfunction
			Seborrheic dermatitis Herpes zoster (shingles), single dermatome Hairy leukoplakia	Severe dermatitis Thrush Weight loss Diarrhea Recurring fever Pulmonary tuberculosis Bacterial infections Recurrent multidermatomal Herpes zoster	Opportunistic infections Lymphoma Wasting syndrome
	p24 antibodies				
	p24, g41 antigens appear 1 to 3 weeks (antigenemia)				Drop in p24 antibody, rise in p24 antigen

Kaposi's sarcoma  
(HHV-8)



# Estimated Incidence of AIDS and Deaths of Adults and Adolescents with AIDS\*, 1985 - 2001, United States




\*Adjusted for reporting delays



# VIRAL STDs, HIV-1 AND AIDS

## PATHOLOGY AND TRANSMISSION



**UNITED NATIONS  
SPECIAL SESSION  
ON HIV/AIDS**

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*Global Crisis—Global Action*

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25-27 June 2001 New York

A large red ribbon is superimposed over the text.