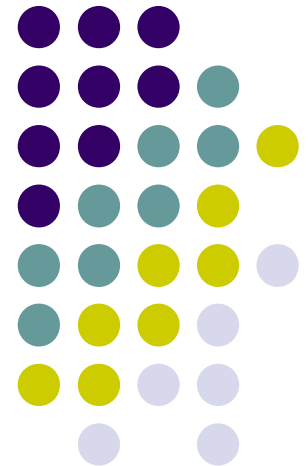
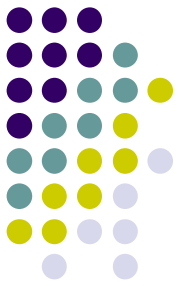


HIV/AIDS

Adapted from www.CDC.gov/hiv and Cowan
& Talaro

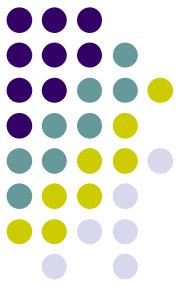
Microbiology: A Systems Approach
Chapter 20 for Microbial World 113
M.O. Lassiter, PhD





What is HIV?

- HIV (human immunodeficiency virus) is the virus that causes AIDS.
- Can be passed from **person to person** when infected blood, semen, or vaginal secretions come in contact with an uninfected person's broken skin or mucous membranes.
- Infected pregnant women can pass HIV to their baby during pregnancy or delivery, as well as through breast-feeding.
- Some HIV infected persons will develop AIDS



What is AIDS?

- AIDS stands for acquired immunodeficiency syndrome.
- Some people infected with HIV will progress to have AIDS
- A diagnosis of AIDS is made by a physician using specific clinical or laboratory standards.

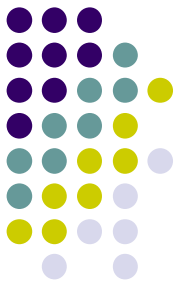
What is AIDS?

www.CDC.gov/hiv



- **Acquired** – the disease is not hereditary but develops after from contact with a disease causing agent (in this case, HIV).
- **Immunodeficiency** – the disease is characterized by a weakening of the immune system.
- **Syndrome** – refers to a group of symptoms that collectively indicate or characterize a disease.

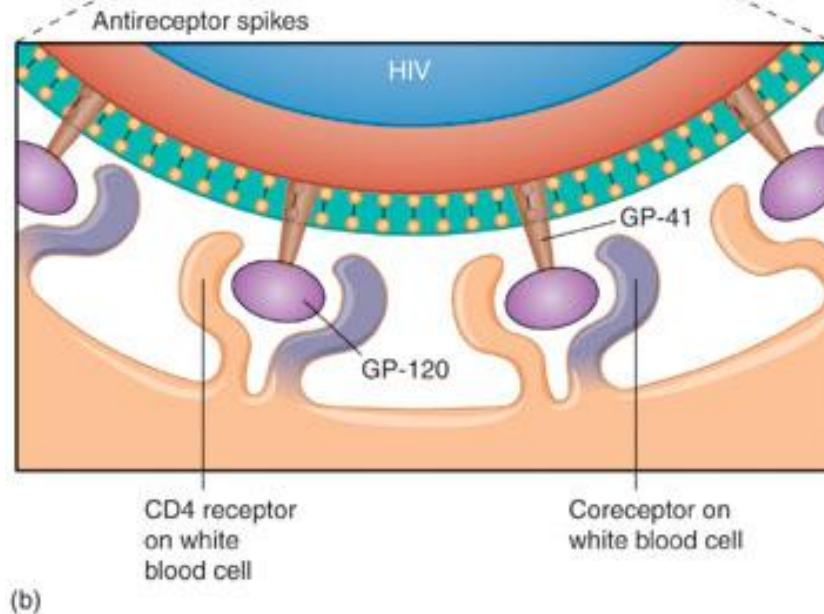
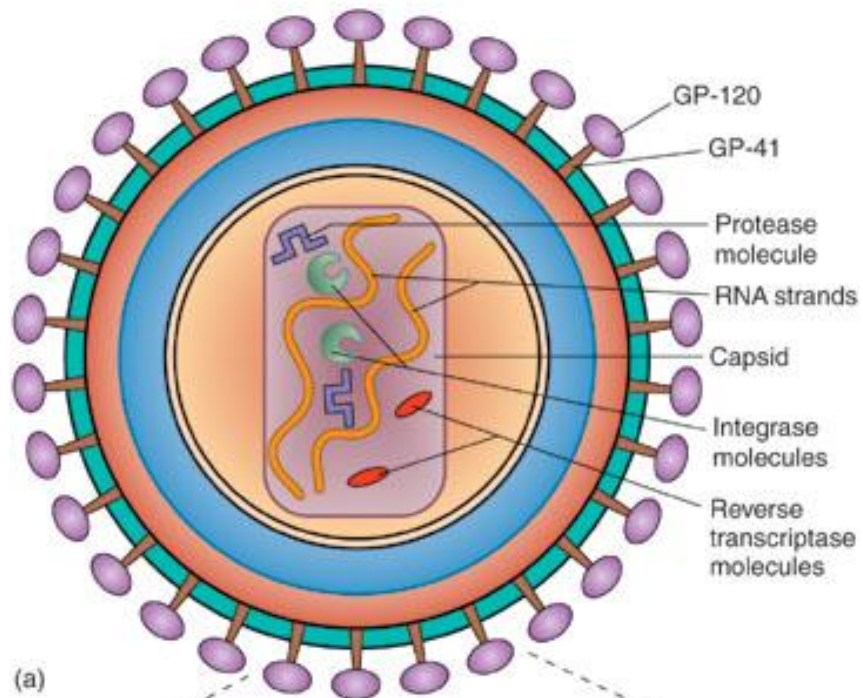
Retroviruses



- enveloped, ssRNA viruses
- encode reverse transcriptase enzyme which makes a DNA copy of their RNA genome
- [Video](#)
- Human Immunodeficiency Virus (HIV) the cause of Acquired Immunodeficiency Syndrome (AIDS)
- HIV-1 & HIV-2
- T-cell lymphotropic viruses I & II - leukemia



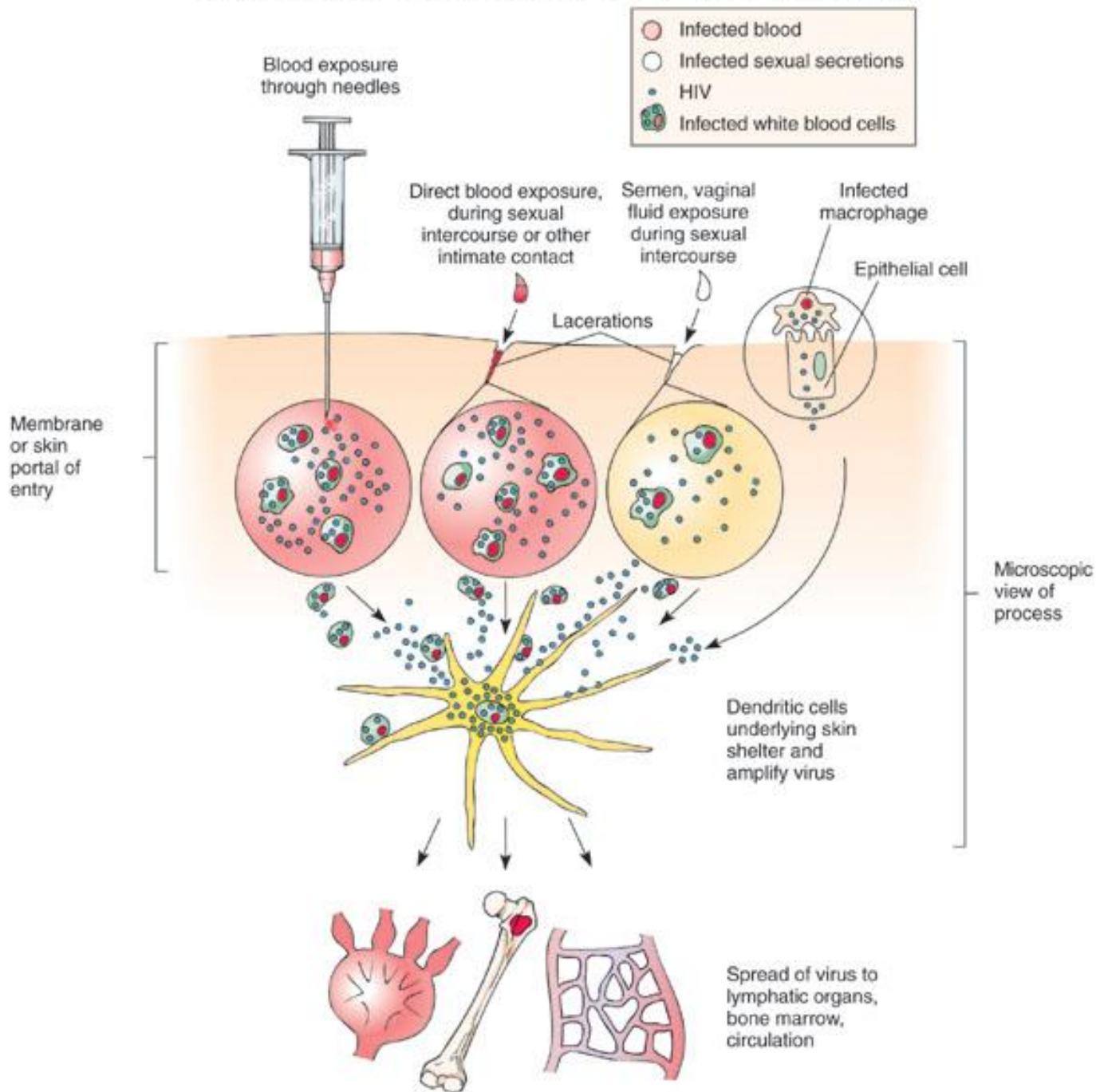
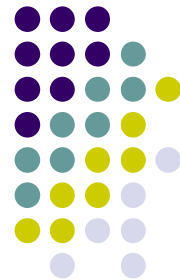
Video



AIDS



- first emerged in early 1980s
- HIV-1 & HIV-2 are not closely related
- HIV-1 may have originated from a chimpanzee virus
- 1959 first documented case of AIDS
- HIV is found in blood, semen, & vaginal secretions.
- HIV is transmitted by sex, sharing needles, and mother to child.
- HIV does not survive long outside of the body.



HIV



- attacks the T helper cells & macrophages
- first signs of AIDS are opportunistic infections such as ***Pneumocystis carinii*** pneumonia (PCP) and cancers such as **Kaposi sarcoma**

[Video](#)

**TABLE 25.4**

Classification System for HIV Infection and Expanded AIDS Case Definition for Adolescents and Adults*

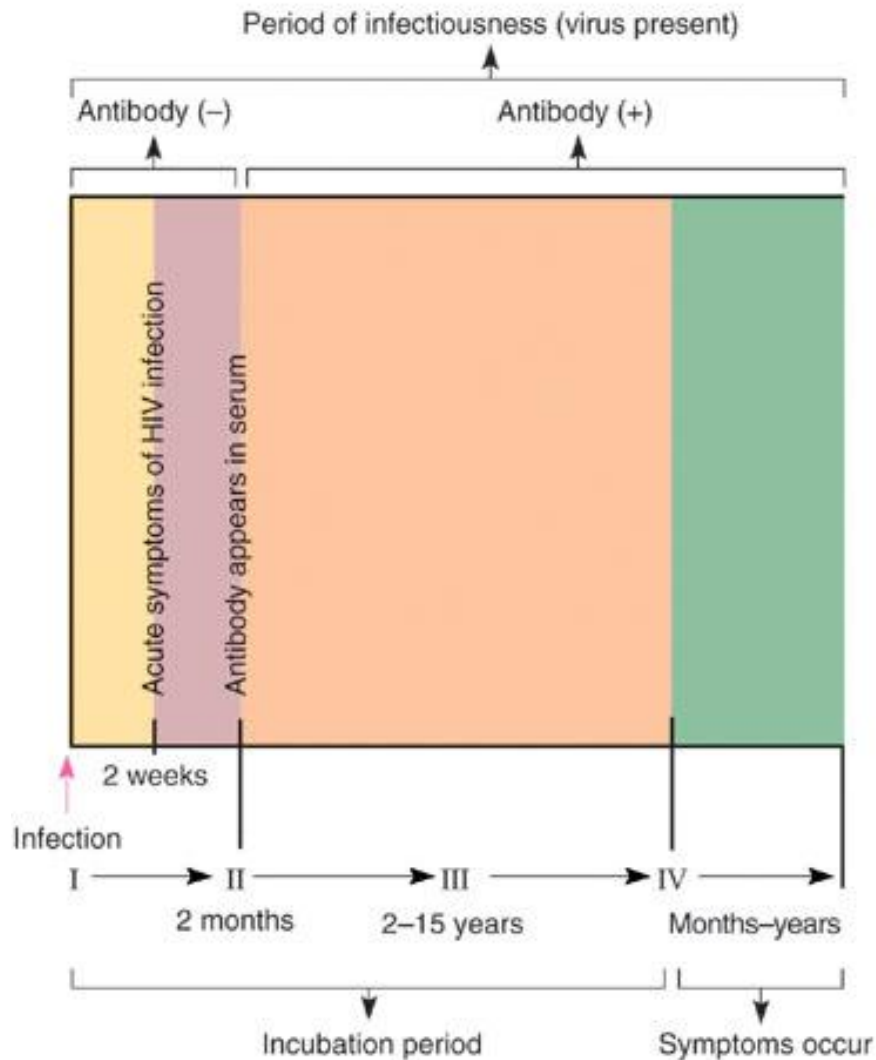
CD4 ⁺ T-cell Category	Clinical Category		
	(A) Asymptomatic, Acute (Primary) HIV Infection or PGL***	(B) Symptomatic, Not (A) or (C) Conditions	(C) Symptomatic AIDS-Indicator Conditions**
(1) $\geq 500/\mu\text{l}$	A1	B1	C1
(2) 200–499/ μl	A2	B2	C2
(3) $< 200/\mu\text{l}$ AIDS-indicator T-cell count	A3	B3	C3

*Persons with AIDS-indicator conditions (category C) as well as those with CD4⁺ T-lymphocyte counts $< 200/\mu\text{l}$ (category A3 or B3) became reportable as AIDS cases in the United States and territories, effective January 1, 1993.

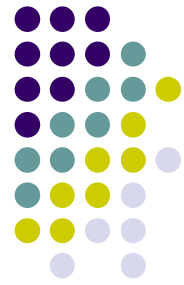
**Includes opportunistic infections, cancers, wasting, dementia (see figure 25.18).

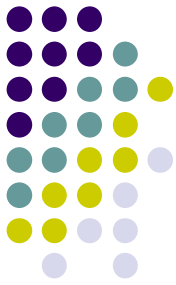
***PGL = persistent generalized lymphadenopathy.

Source: Data from Morbidity and Mortality Weekly Report, vol. 41. December 18, 1992. The Centers for Disease Control and Prevention, Atlanta, GA.

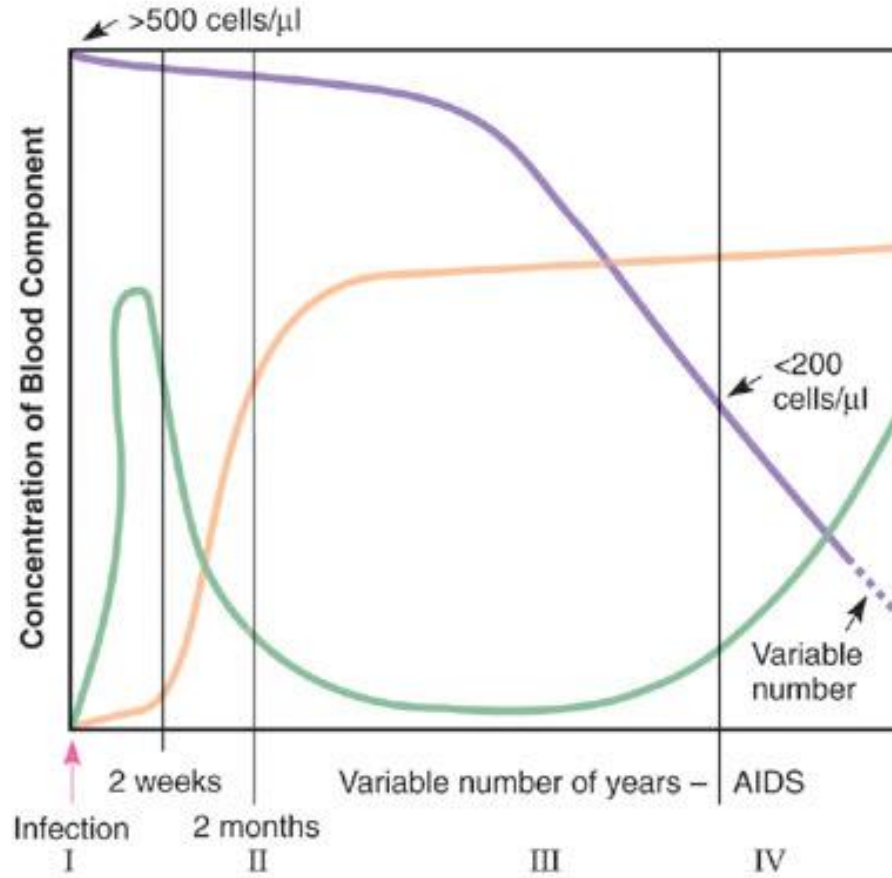


- (I) Infection with virus.
- (II) Appearance of antibodies in standard HIV tests.
- (III) Asymptomatic HIV disease, which can encompass an extensive time period.
- (IV) Overt symptoms of AIDS include some combination of opportunistic infections, cancers, and general loss of immune function.

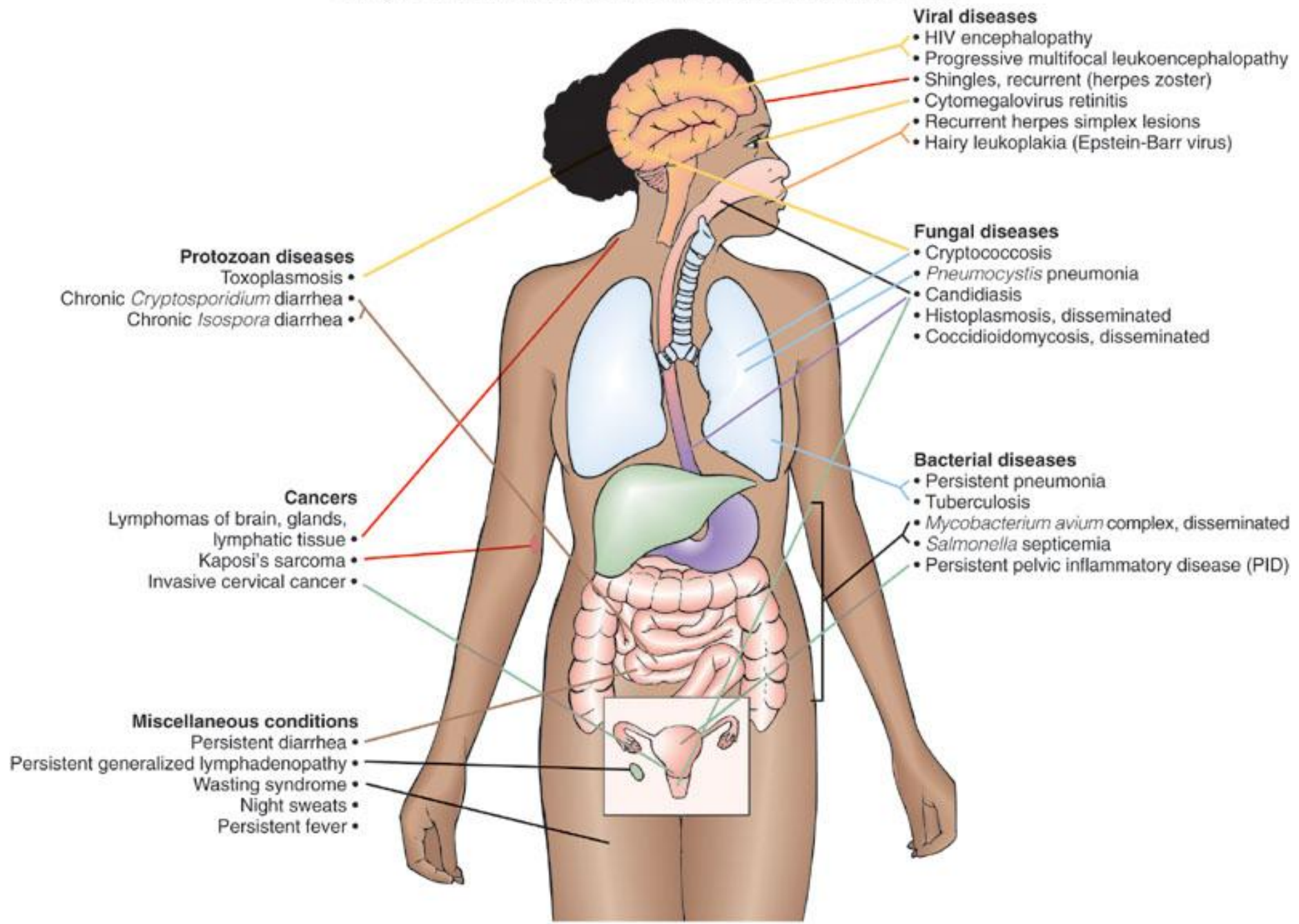




- Level of virus antigen
- Level of antibodies to one or more antigens
- Level of CD4 T cells

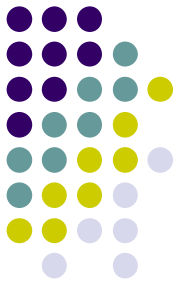


A comparison of blood levels of viruses, antibodies, and T cells covering the same time frame depicted in figure 25.16. Virus levels are high during the initial acute infection and decrease until the later phases of HIV disease and AIDS. Antibody levels gradually rise and remain relatively high throughout phases III and IV. T-cell numbers remain relatively normal until the later phases of HIV disease and full-blown AIDS.

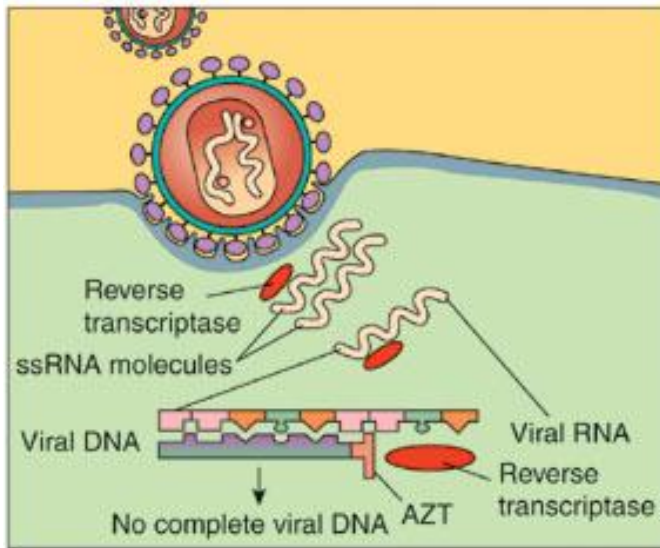




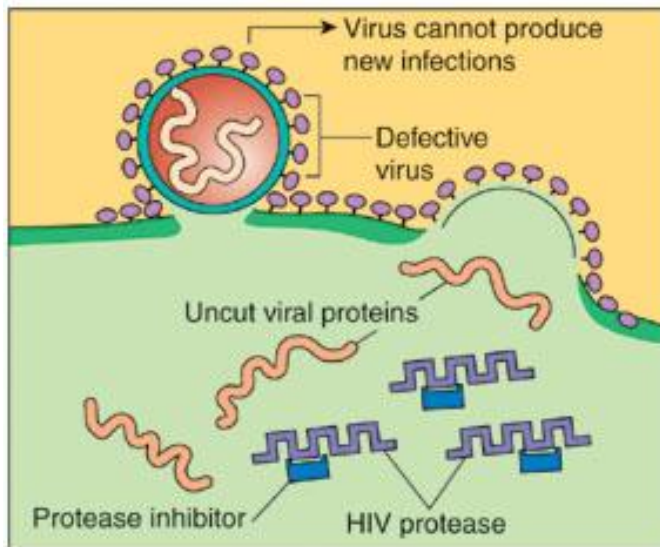
HIV



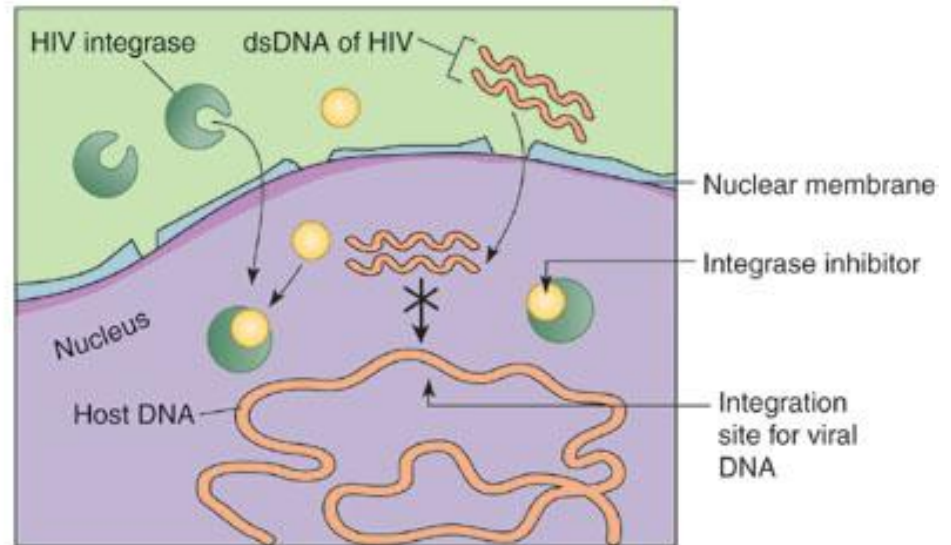
- treatments
 - inhibit viral enzymes: reverse transcriptase, protease, integrase
 - inhibit fusion
 - inhibit viral translation
- no vaccine
- prevention
 - monogamous sexual relationships
 - condoms
 - universal precautions



(a) A prominent group of drugs (AZT, ddi, 3TC) are nucleoside analogs that inhibit reverse transcriptase. They are inserted in place of the natural nucleotide by reverse transcriptase but block further action of the enzyme and synthesis of viral DNA.



(b) Protease inhibitors plug into the active sites on HIV protease. This enzyme is necessary to cut elongate HIV protein strands and produce functioning smaller protein units. Because the enzyme is blocked, the proteins remain uncut, and abnormal defective viruses are formed.



(c) Integrase inhibitors are a new class of experimental drugs that attach to the enzyme required to splice the dsDNA from HIV into the host genome. This will prevent formation of the provirus and block future virus multiplication in that cell.

HIV/AIDS



Conclusions:

Proper protection

Treatment with antiviral drugs

No current vaccine

Vaccine would not help those already infected

Problems with resistance to drugs?

Worldwide patterns

Meets definition of a pandemic