

HIV Progression to AIDS



Diana, Princess of Wales, shakes hands with an AIDS victim as she opens a new ward for AIDS patients at the Middlesex Hospital on April 9, 1987, in London.

Anwar Hussein/WireImage—Getty Images



[Tanzania suspends **HIV/AIDS** programs in new crackdown on gays](#)

[Chicago Tribune](#) - Nov 23, 2016

But in a move that has alarmed health workers, Tanzania is turning its anti-homosexual fury in a new direction - targeting **HIV/AIDS** programs ...



[Prince Harry and Rihanna get tested for World AIDS Day](#)

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The Barbadian pop princess joined the British royal on Thursday for the Barbados National **HIV/AIDS** Commission's "Man Aware" event, held in ...

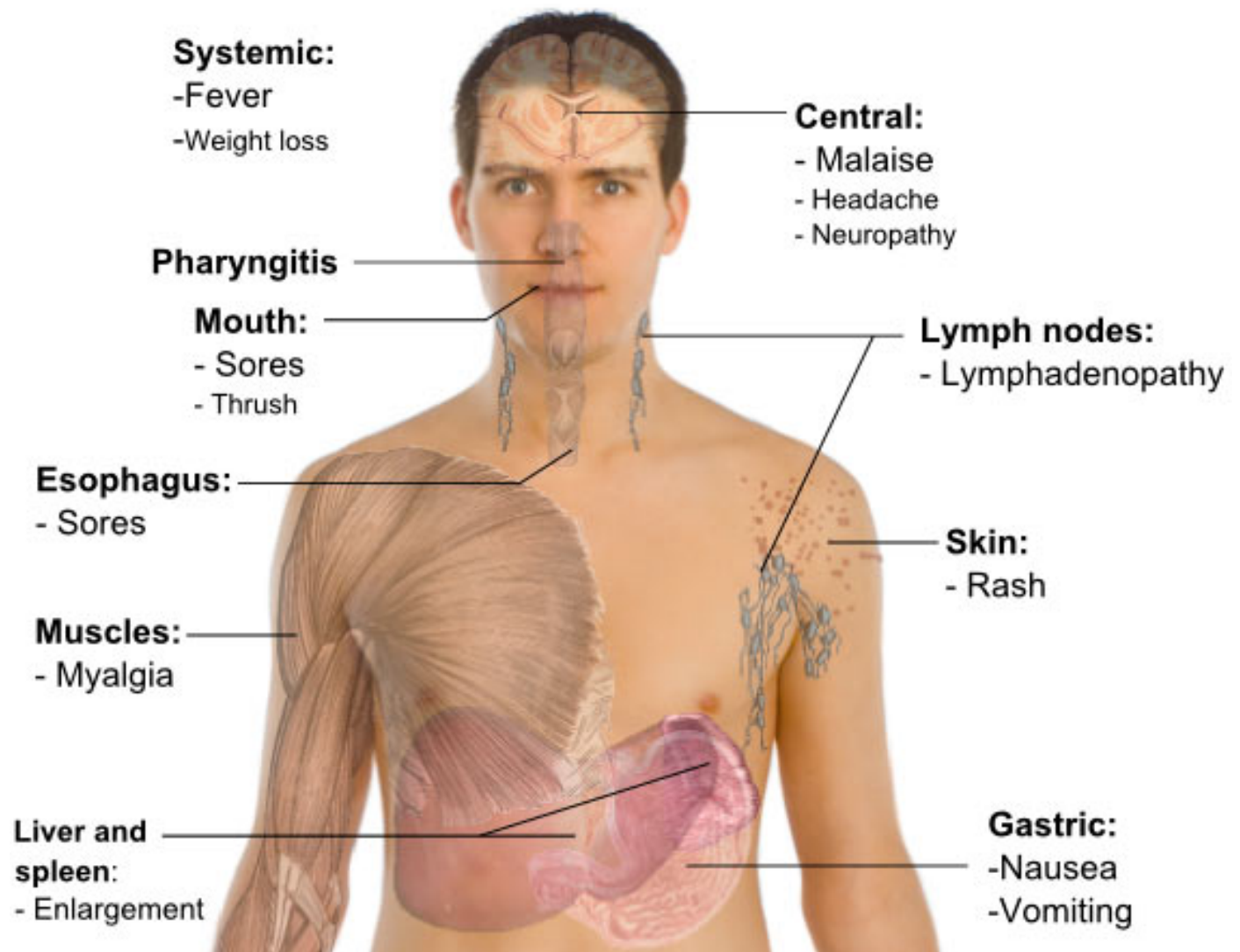
[Prince Harry and Rihanna take a HIV test together in Barbados on ...](#)
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Acute HIV Symptoms

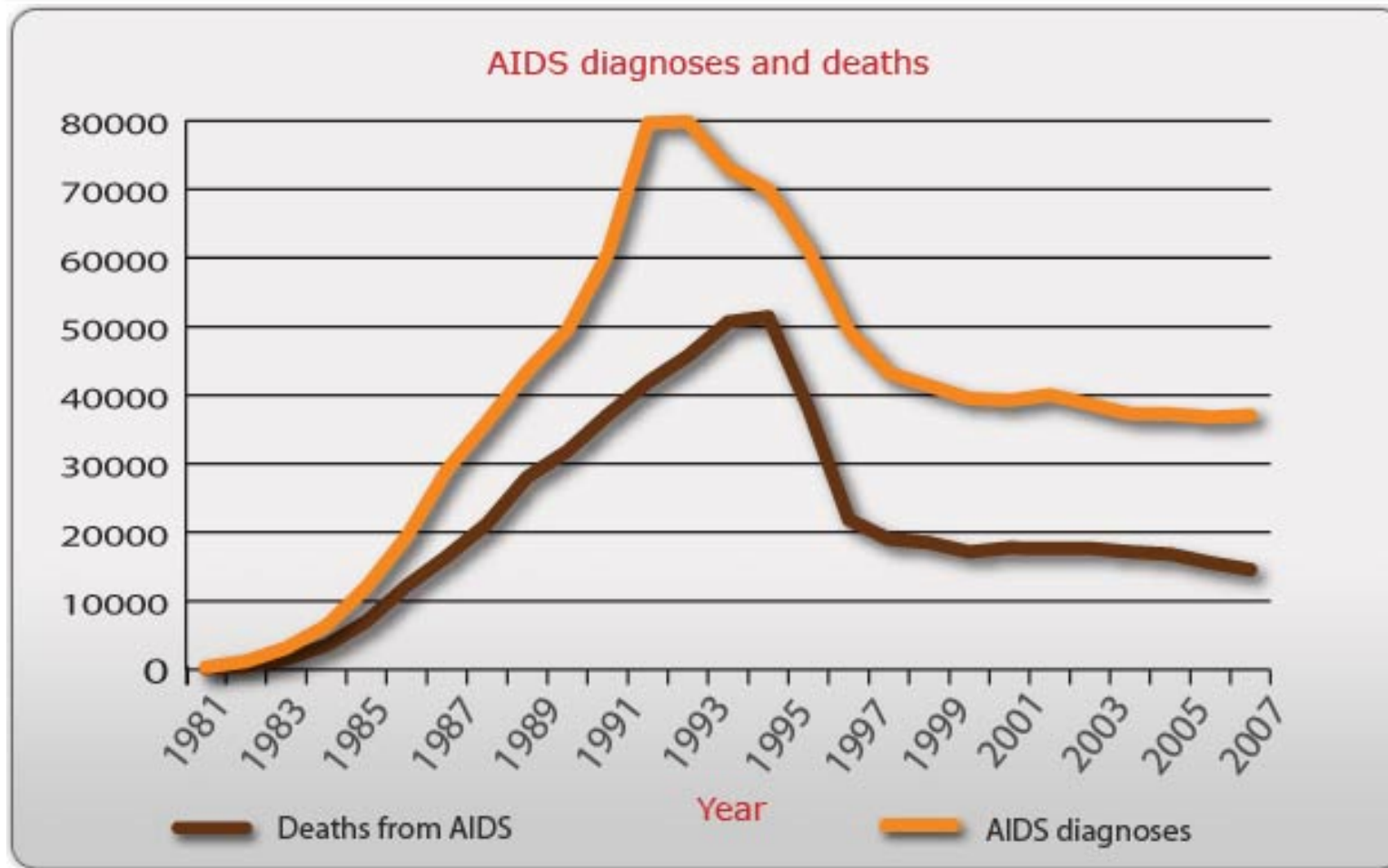
Main symptoms of Acute HIV infection



Viral and Host Factors Influencing the Progression to AIDS

- ❑ Viral load - the amount of virus in the blood of an HIV-infected person**
- ❑ Most individuals with a rapid progression to AIDS have viruses that replicate rapidly and are more cytopathic with a wide cellular host range**
- ❑ Antibodies that enhance virus infection can permit HIV spread to several different cell types including lymphocytes, macrophages and fibroblasts.**
- ❑ Cellular immune responses can destroy virus-infected cells or suppress virus release via the production of antiviral cytokines or mechanisms involving cell: cell interaction.**

New AIDS Definition - 1993



Cases peaked with the 1993 expansion of the case definition, and then declined. CD4 T-Cells, Cervical Cancer, Pulmonary TB and recurring pneumonia were added as AIDS defining illnesses. The most dramatic drops in both cases and deaths began in 1996, with the widespread use of combination antiretroviral therapy.

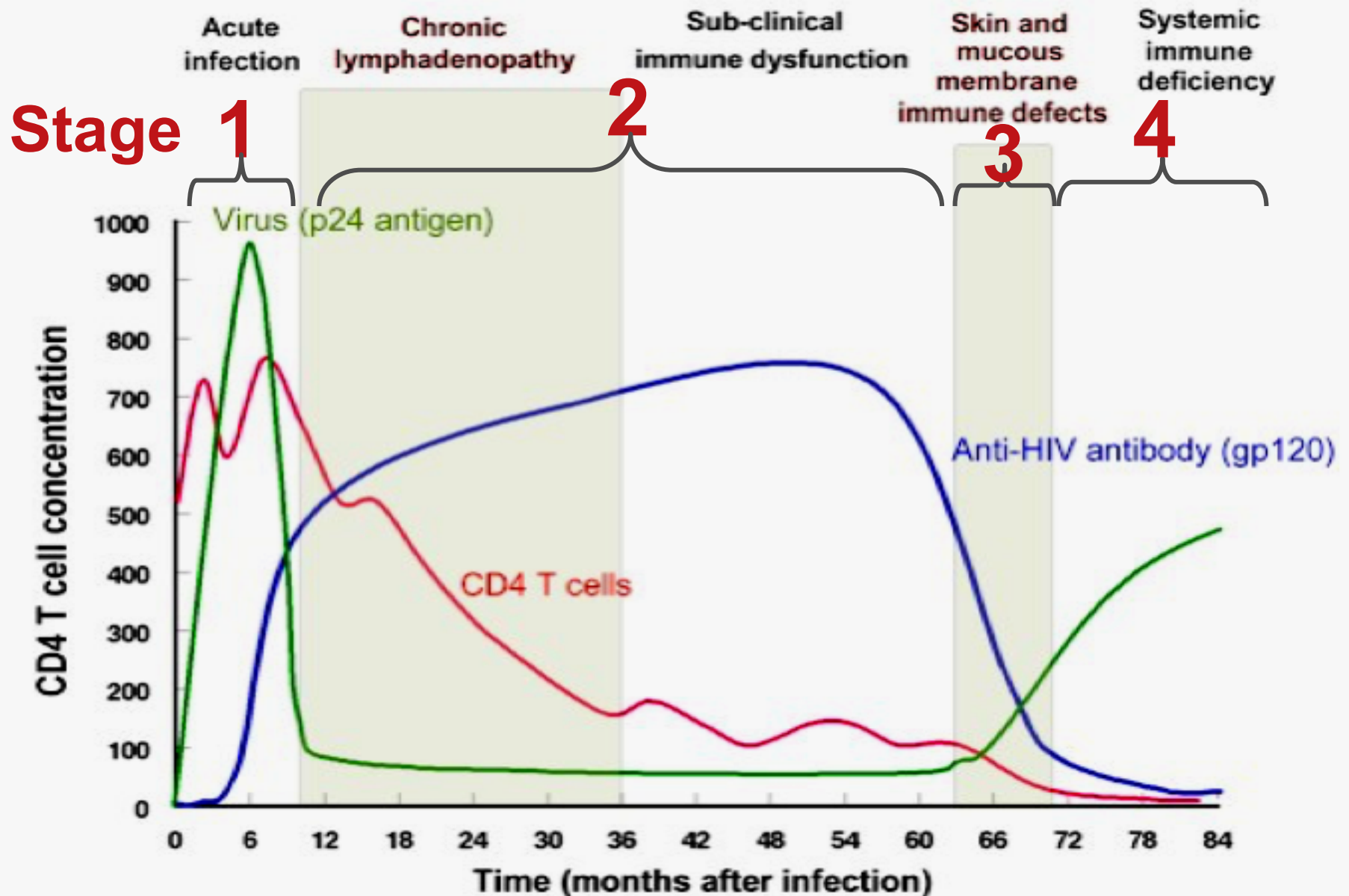
The CDC's Definition of AIDS

- ☐ All HIV-infected people with fewer than 200 CD4+ T cells per cubic millimeter of blood (compared with CD4+ T cell counts of about 1,400 for healthy people) or
- ☐ His or her CD4+ cells account are fewer than 14 percent of all lymphocytes
- ☐ That person has been diagnosed with at least one or more of the two dozen AIDS-associated conditions that result from HIV's attack on the immune system

The Stages of HIV Infection

- ☐ **STAGE 1: Primary HIV Infection** - short flu-like illness; large amount of HIV in the peripheral blood; seroconversion (HIV antibodies) and cytotoxic lymphocytes
- ☐ **STAGE 2 : Clinically Asymptomatic Stage** - lasts for an average of ten years; free from major symptoms; there may be swollen glands; HIV level in peripheral blood drops to very low levels; patient remains infectious; T helper cell infection
- ☐ **STAGE 3 : Symptomatic HIV Infection** - Over time the immune system loses the struggle to contain HIV; lymph nodes and tissues become damaged; HIV mutates and becomes more pathogenic; T helper cell destruction; emergence of opportunistic infections such as *Oral Candidiasis (thrush)* or hairy cell leukoplakia
- ☐ **STAGE 4 : Progression from HIV to AIDS** - As the immune system becomes more and more damaged the illnesses presented become more and more severe leading eventually to an AIDS diagnosis; CD4 cell count below 200/mm³; opportunistic infections

Immune Response and Stage of Infection



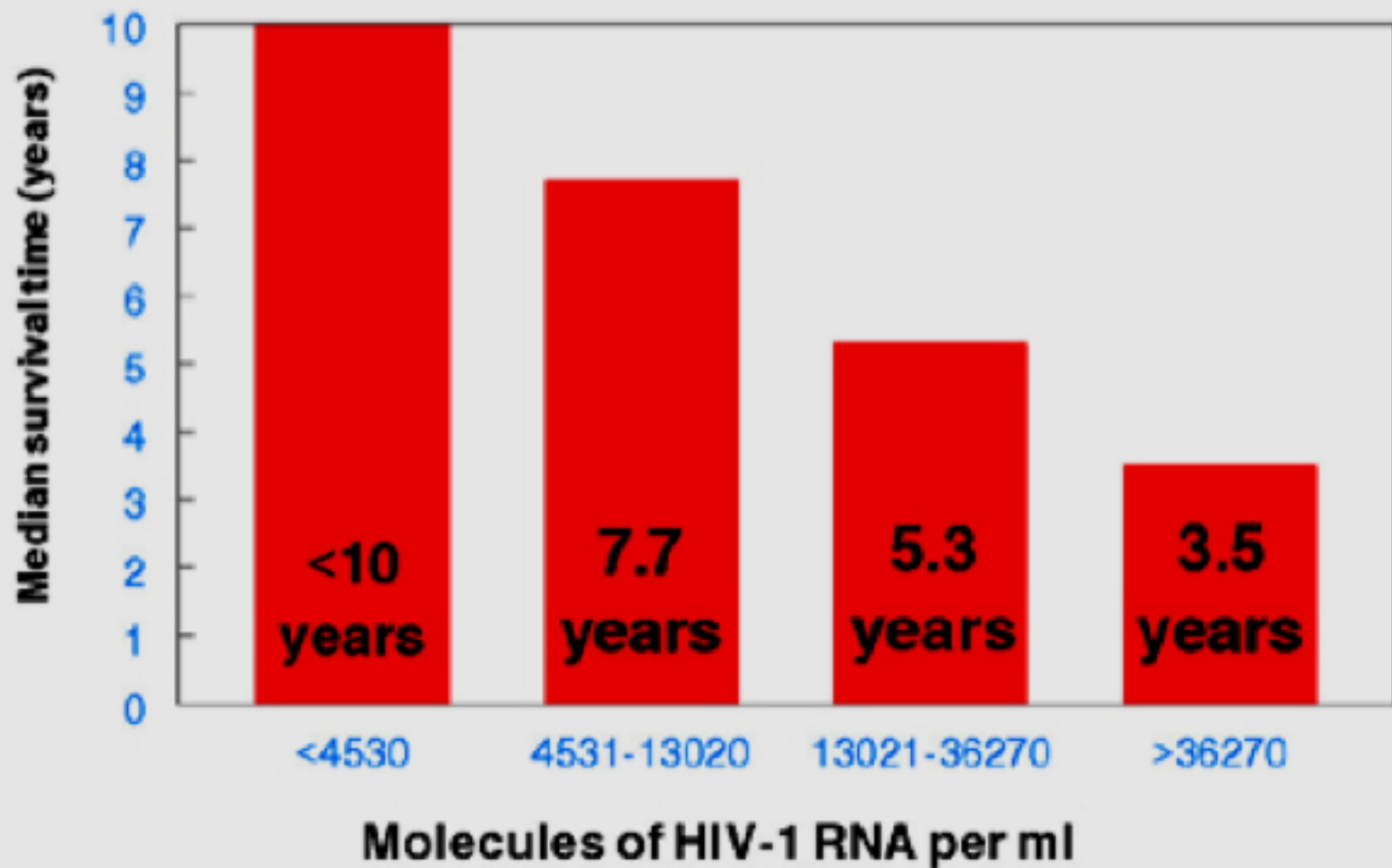
Progression to AIDS

Progression to AIDS is more rapid under the following circumstances:

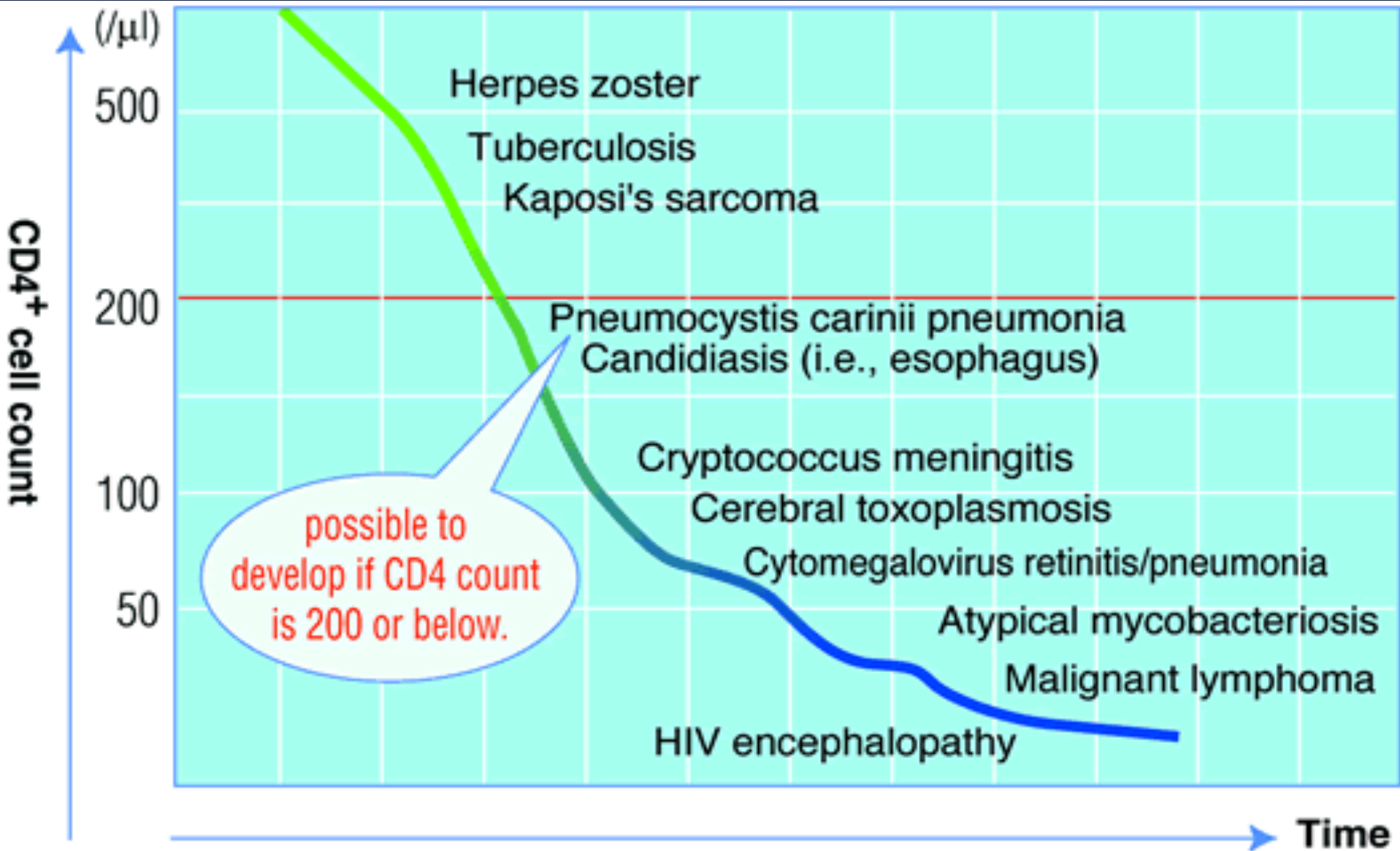
- ☐ When **Syncytia** forming HIV is present
- ☐ When **acute** infection is **symptomatic**
- ☐ When HIV infection occurs with a **drug resistant strain**
- ☐ When a higher “**set point**” of HIV RNA follows initial viremia after infection
- ☐ When **patient smokes**
- ☐ When **opportunistic infections** or **neoplasms** are present
- ☐ When in congenital cases, there are **signs of infection less than 3 months of age**

Viral Load and Progression to AIDS

Relation between baseline viral load and median survival time



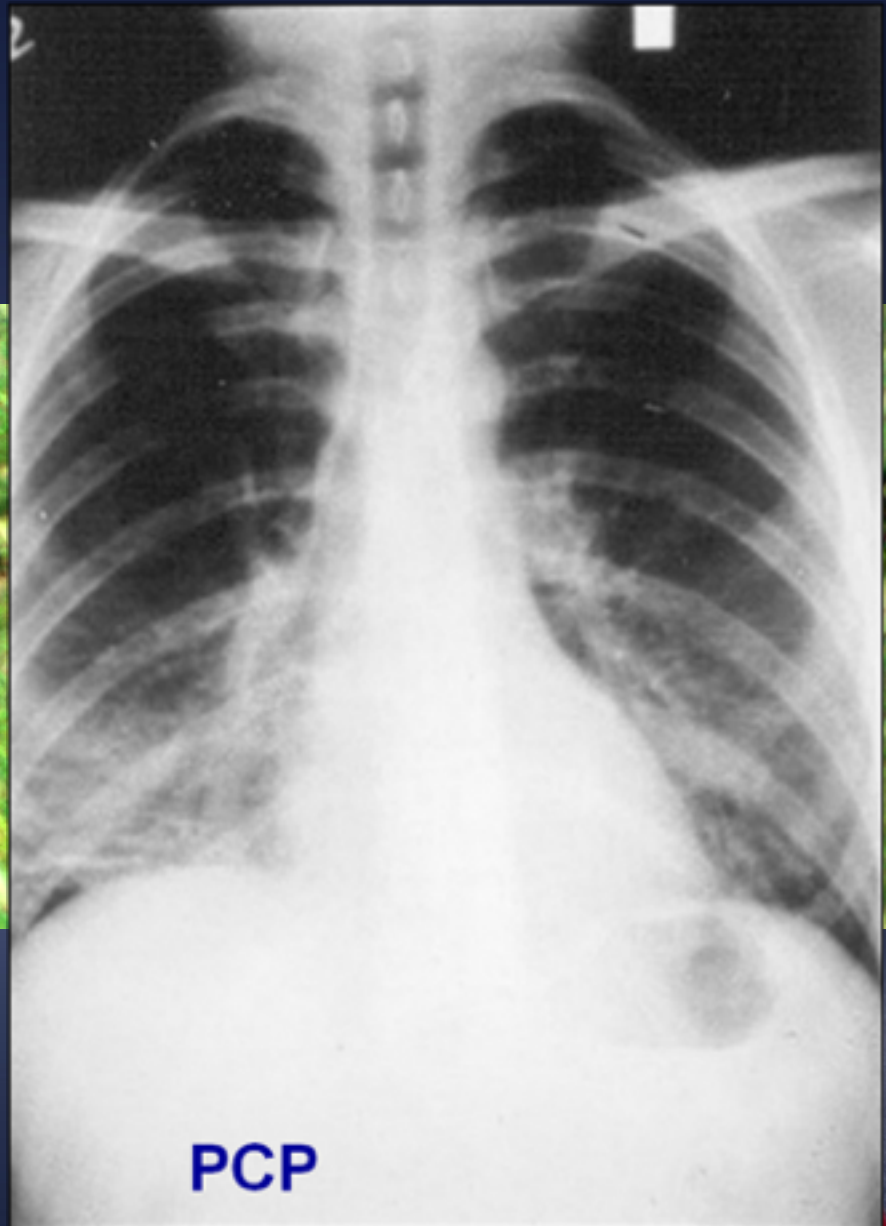
CD4 Cell Count Predict Likelihood of developing AIDS



AIDS Opportunistic Infections



Kaposi Sarcoma



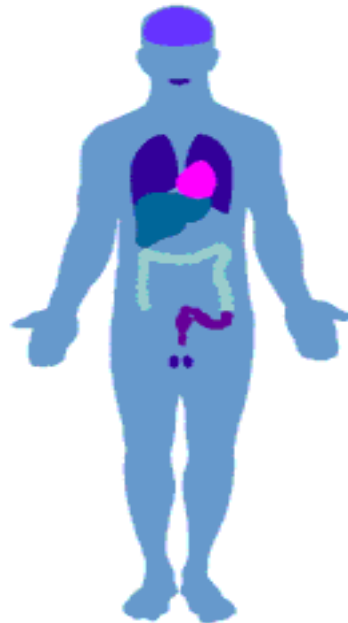
PCP



Oral Thrush

AIDS Opportunistic Infections

Opportunistic infections are caused by bacteria, viruses, and other protozoa that a healthy body normally would be capable of fighting. Opportunistic infections frequently associated with HIV and AIDS include *Pneumocystis carinii* pneumonia (PCP), cerebral toxoplasmosis, cytomegalovirus (CMV) infection, and disseminated *Mycobacterium avium* complex (MAC) infection. Antibiotic prophylaxis may prevent the onset of certain illnesses.



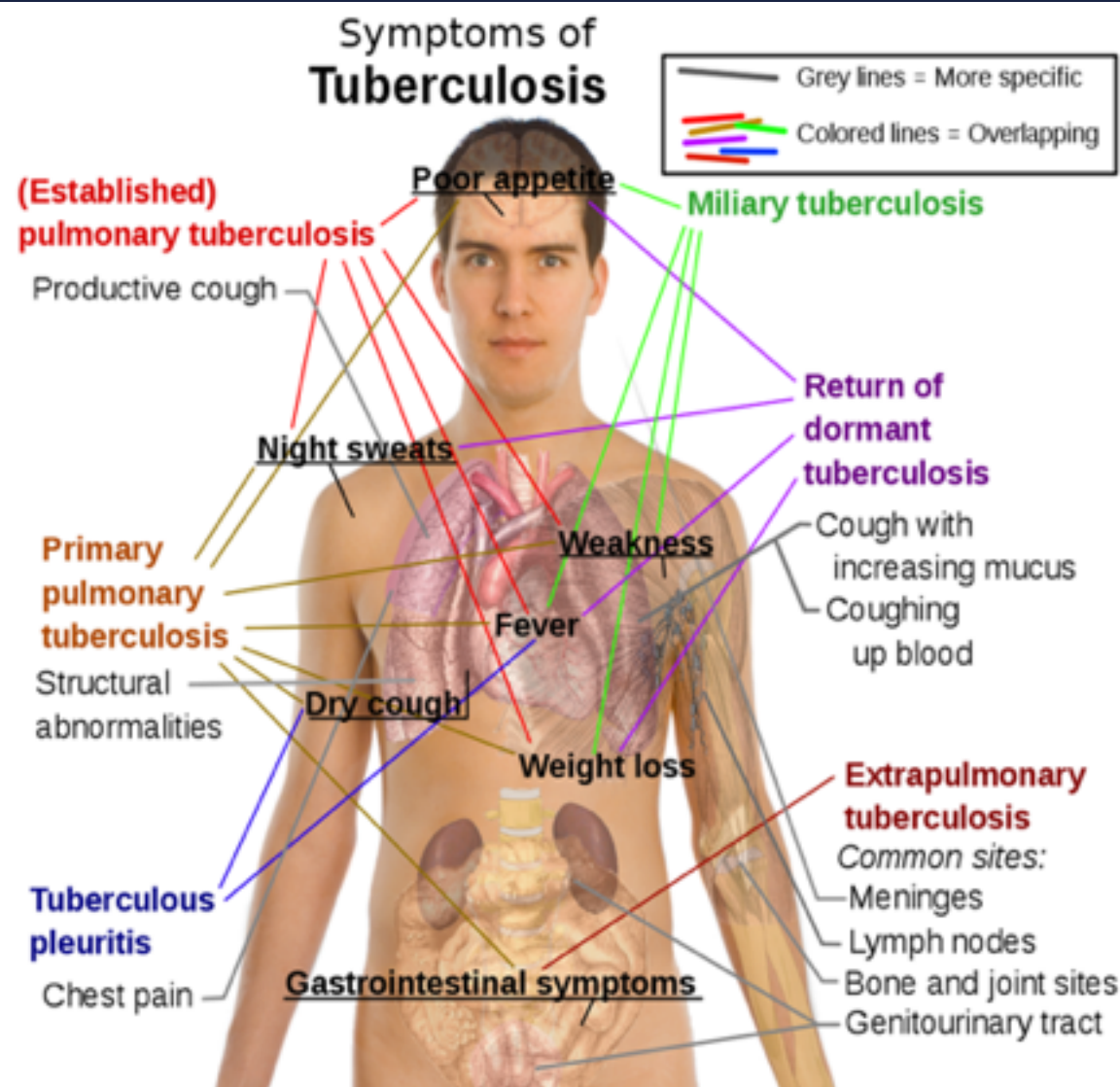
1. Lung
 - *Pneumocystis carinii* pneumonia
 - *Mycobacterium tuberculosis*
2. Mouth
 - Oral/esophageal candidiasis
 - Oral hairy leukoplakia (OHL)
 - Kaposi's sarcoma (KS)
3. Liver
 - MAC
 - CMV hepatitis
4. Cerebral
 - Toxoplasmosis
 - Progressive multifocal leukoencephalopathy (PML)
5. Colon
 - CMV colitis

6. Genitals
 - Herpes simplex virus (HSV) ulcers
 - Vaginal candidiasis
 - Genital warts (Human papillomavirus [HPV])

7. Eyes
 - CMV retinitis/uveitis



Tuberculosis and HIV



- ❑ 1/3 persons living with HIV infection are co-infected with TB
- ❑ TB is the leading cause of death among people living with HIV in Africa
- ❑ TB is the cause of death for as many as 50% of all persons with AIDS

I am Dying of AIDS





Join us
for a Special Screening of
"The Lazarus Effect",
a new film by (RED) and HBO



Signs of Hope

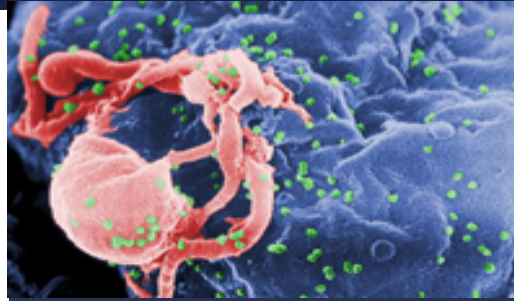
90-90-90



On a grander scale, the new data show that each of these three countries is approaching the UNAIDS goal to control HIV/AIDS epidemics, which is known as 90-90-90. UNAIDS modeling shows that epidemics will peter out if 90% of infected people know their HIV status, 90% of that group receive antiretrovirals, and 90% on treatment have undetectable viral levels. This translates to 73% of HIV-infected people in a population with undetectable viral levels—including those who don't know their status and have uncontrolled infections. In the United States, only about 30% of HIV-infected people have achieved this. PHIA found that Malawi already is at 67.6%, Zimbabwe is 60.4%, and Zambia is 59.8%. "We're getting very close to the number that shuts down epidemics," Birx says.

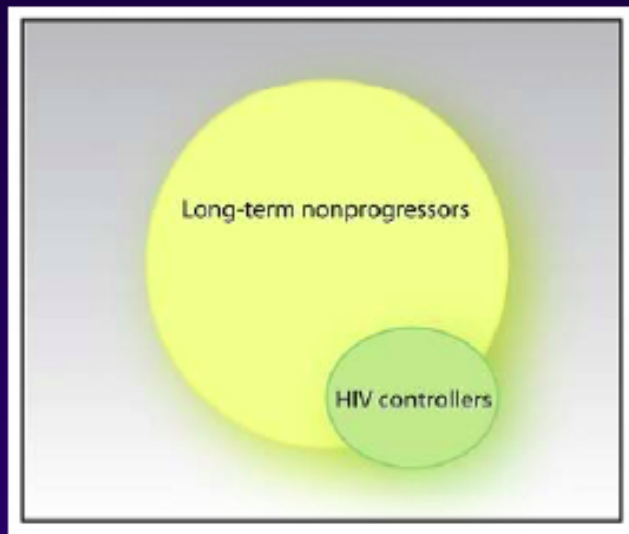
HIV Elite Controllers

- ❑ HIV-infected individuals with asymptomatic HIV infection
- ❑ long term control of virus to undetectable or nearly undetectable levels



Elite controllers have a rare set of genes that allow their immune systems to unleash killer T cells (CD8 T cells) with a greater ability to kill viruses

Elite Controllers (EC)



- EC: $\leq 1\%$ of HIV+
- Maintain durable HIV control to <50 copies/mL without HAART
- Rarely progress
- Also known as HIV controllers

Deeks SG and Walker BD: Immunity 27:1286, 2007



Definitions: LTNP

- Definition is based on immunologic control (i.e. stability of CD4 counts) and duration of follow-up
 - Clinically and immunologically stable for duration of 7-10* years without HAART
- Plasma virus load is usually <2,000 HIV RNA copies/ml
- Symptom-free
- Incidence among HIV+ persons: approx. 5%
- Most ultimately manifest deterioration in CD4 counts*
- * Stringent classification of LTNP (Okulicz, JF et al, JID 200:1714–23, 2009) reveals differences in outcomes based on duration (7 yrs vs 10 yrs) of LTNP status



Possible virologic and host factors involved in HIV control

- Virus
 - Mutations/defective virus
 - Viral Fitness
- Host
 - Genetics (polymorphisms influencing virus entry or HLA)
 - Anti-viral host restriction factors
 - Immune response
 - Innate Immunity
 - Cytotoxic CD8 T cells
 - CD4 T cells
 - Neutralizing antibody

