Microbiology (Bio 206) #40:
HIV and AIDS

Terms you should know:

- AIDS
- acute phase
- protease
- HIV
- chronic phase
- protease inhibitor
- retrovirus
- virus load
- HAART
- reverse transcriptase
- RT inhibitor
- AIDS "cocktail"
- CD4+ T-lymphocytes

Questions you should be able to answer:

- What is AIDS, and how does the HIV virus cause this disease?
- What are some factors that make this virus particularly difficult to deal with?
- Why isn’t it easy to develop a vaccine against HIV?
- What is the difference between HIV’s chronic stage and a latent infection?
- What are some possible targets for antiviral drug therapy?
- What are the best strategies for preventing the spread of AIDS today?

Lecture outline:

I. HIV and AIDS
   A. HIV (human immunodeficiency virus)
      1. Enveloped RNA virus
      2. Retrovirus (makes DNA copy of RNA and integrates into host genome)
      3. Specifically infects (and kills) T-helper cells (CD4+ T-lymphocytes)
   B. AIDS (acquired immunodeficiency syndrome) - first recognized in 1981, now pandemic
      1. Acute phase: rapid drop in $T_H$ cells and increase in viral load; mono-like symptoms
      2. Chronic phase (5-10 years): steady viral load and CD4 levels
      3. AIDS: severe immunodeficiency as $T_H$ cells drop too low to fight disease
      4. Death is usually due to some secondary infection; mortality rate is 100% so far

II. Fighting the disease
   A. Vaccine research
      1. Natural immunity does not prevent or eradicate infection
      2. Antibodies are easily produced but not protective
      3. Live, attenuated vaccines (which might produce good CMI) considered too dangerous
      4. HIV mutates rapidly (RT is not as accurate as DNA polymerase)
      5. No really good animal model
   B. Antiviral drug therapy
      1. RT inhibitors attempt to selectively attack reverse transcriptase
      2. Protease inhibitors attempt to selectively attack viral protease
      3. Resistance develops rapidly due to high rate of viral mutation
      4. HAART (AIDS “cocktail”) combines these therapies and is most successful so far
      5. HAART does not cure AIDS and may not prevent eventual death
   C. Prevention and education
      1. Safer sex practices, abstinence, etc.
      2. Currently, most at-risk groups are minorities (especially blacks), heterosexual women