Nursing Care Of Patients With HIV Disease/AIDS

Chapter 19

Introduction

- Acquired immunodeficiency syndrome (AIDS)
  - Chronic & progressive immune function dx
    - Final phase
  - Caused by human immunodeficiency virus (HIV)

CDC Definition of AIDS

- Less than 200 CD4+ T lymphocytes/mcl

  or

- CD4+ T lymphocyte percentage of total lymphocytes < 14

  and

- Opportunistic clinical disease

Incidence

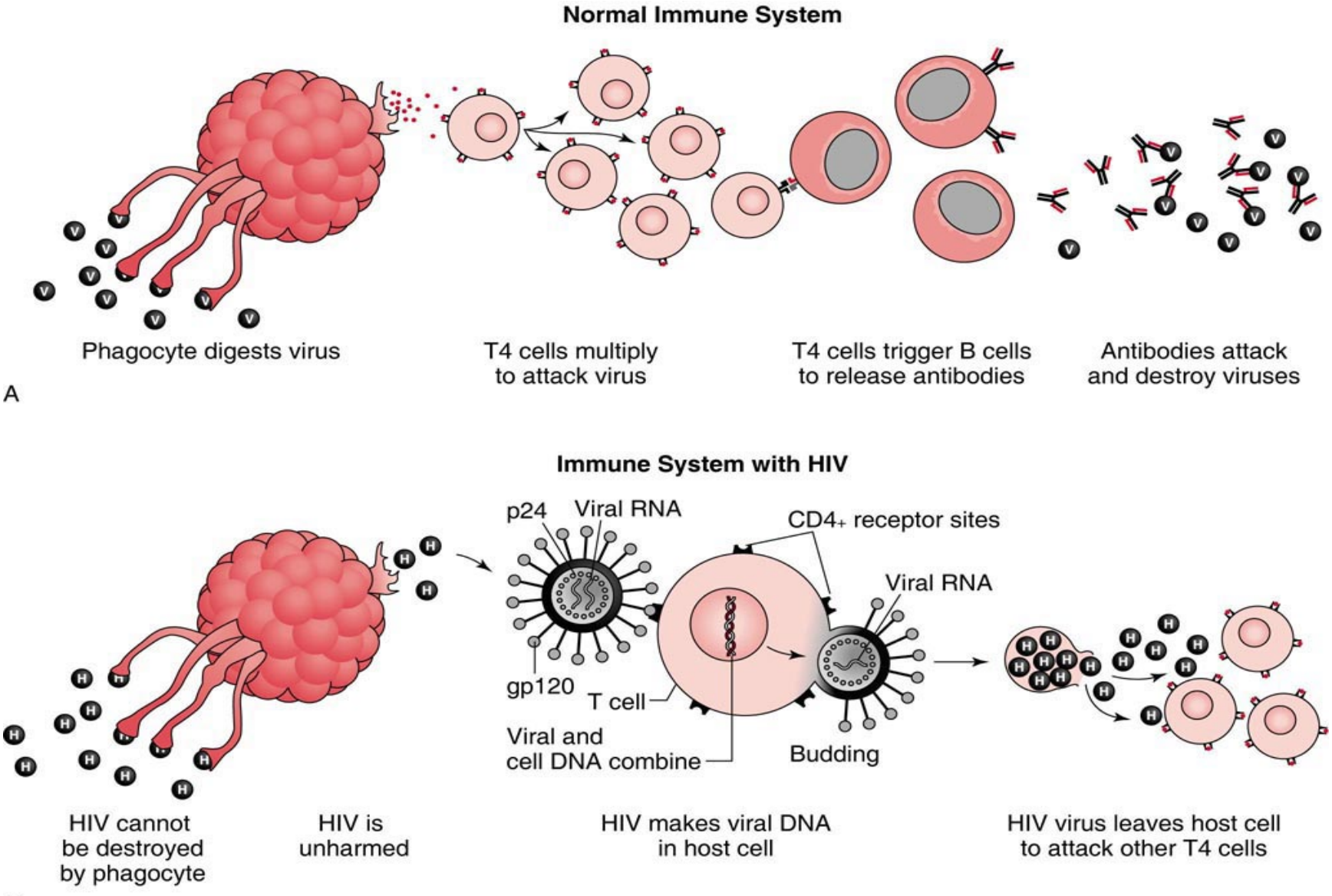
- 40,000 new U.S. cases of HIV annually
- Increasing fastest
  - Women and men who have sex with men
    - Especially in racial and ethnic minorities
- HIV increasing in those older than 50
- Highly Active Antiretroviral Therapy (HAART)
  - Increasing lifespan

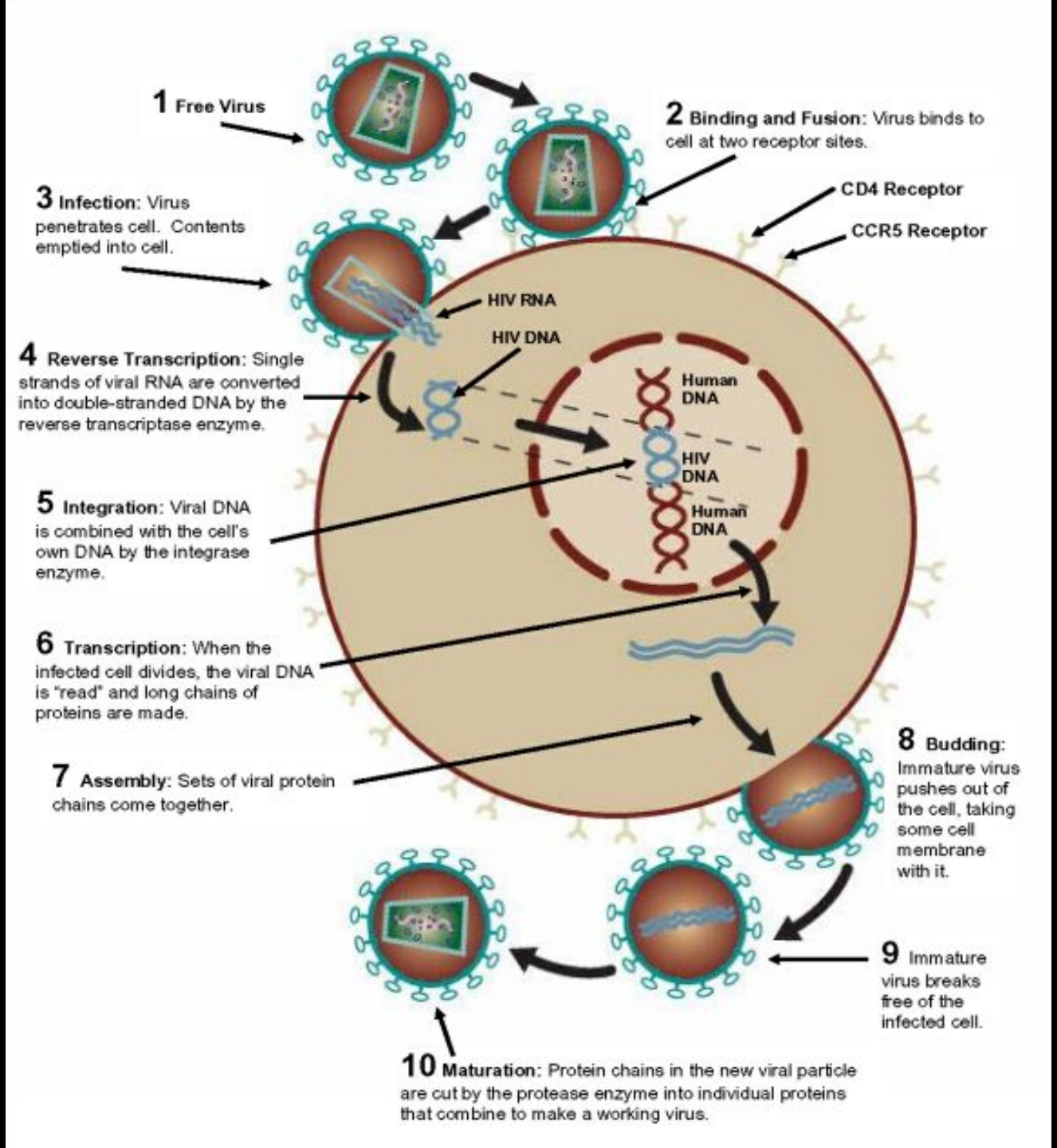
Pathophysiology

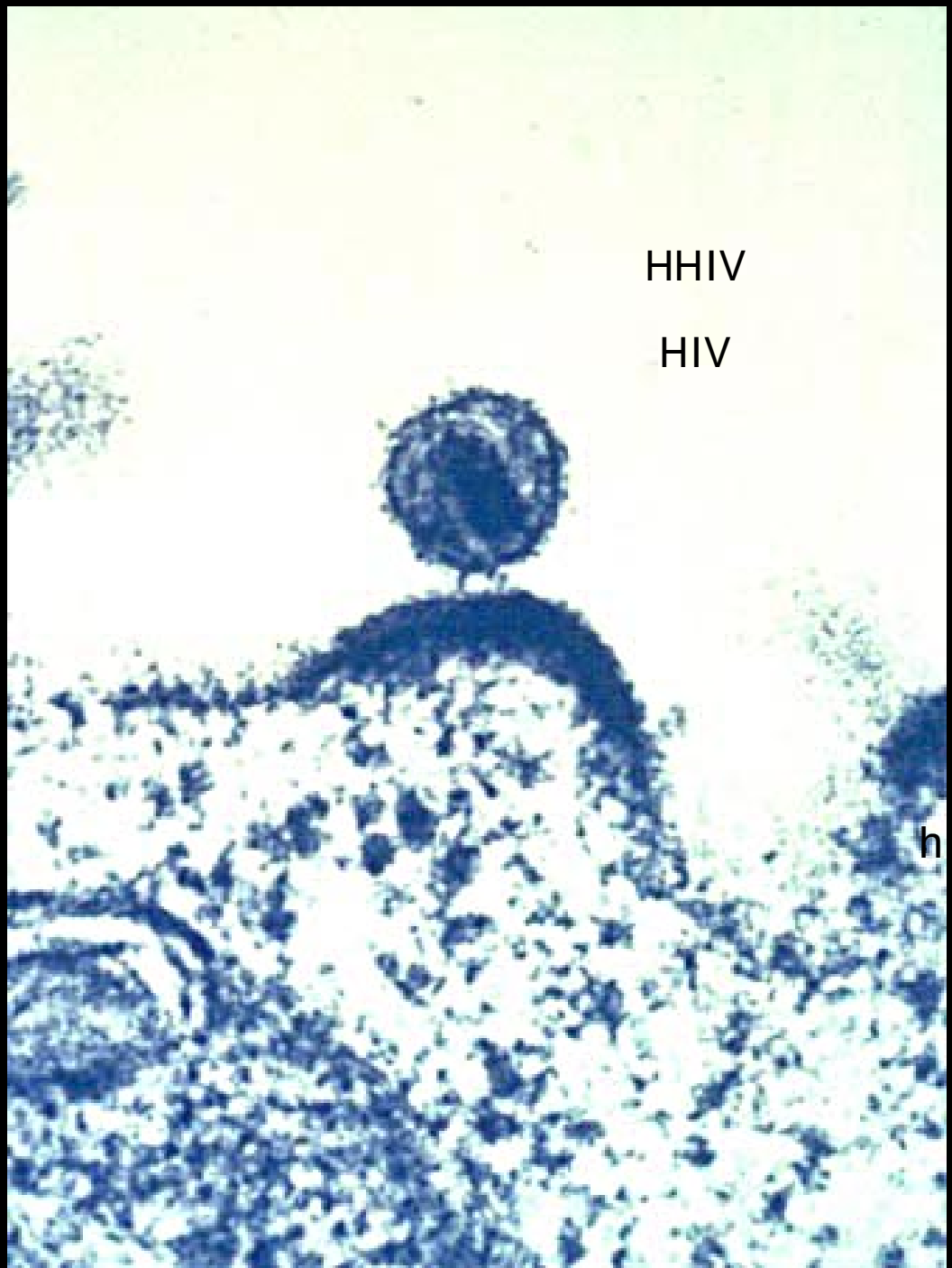
- Destroys immune cells
  - Leads to immunodeficiency
    - Eventual AIDS
      - Infections & cancers
- Two subtypes – both cause AIDS
  - HIV-1
    - Found in Asia, Europe, Western Hemisphere
  - HIV-2
    - West Africa

Pathophysiology (cont.)

- HIV is a retrovirus
- After human cell invasion
  - Viral covering destroyed
    - Viral RNA exposed
    - Reverse transcriptase
      - Forces human cell to produce a new strand of DNA
        - » From the viral RNA
      - New DNA is integrated into pts cellular DNA
        - » Human cell creates more viral particles instead of new human cells
        - » Spread through the lymphoid system




1 Free Virus
2 Binding and Fusion: Virus binds to cell at two receptor sites.
CD4 Receptor
CCR5 Receptor
3 Infection: Virus penetrates cell. Contents emptied into cell.
HIV RNA
HIV DNA
4 Reverse Transcription: Single strands of viral RNA are converted into double-stranded DNA by the reverse transcriptase enzyme.
Human DNA
HIV DNA
Human DNA
5 Integration: Viral DNA is combined with the cell's own DNA by the integrase enzyme.
6 Transcription: When the infected cell divides, the viral DNA is "read" and long chains of proteins are made.
7 Assembly: Sets of viral protein chains come together.
8 Budding: Immature virus pushes out of the cell, taking some cell membrane with it.
9 Immature virus breaks free of the infected cell.
10 Maturation: Protein chains in the new viral particle are cut by the protease enzyme into individual proteins that combine to make a working virus.


HHIV
HIV
h

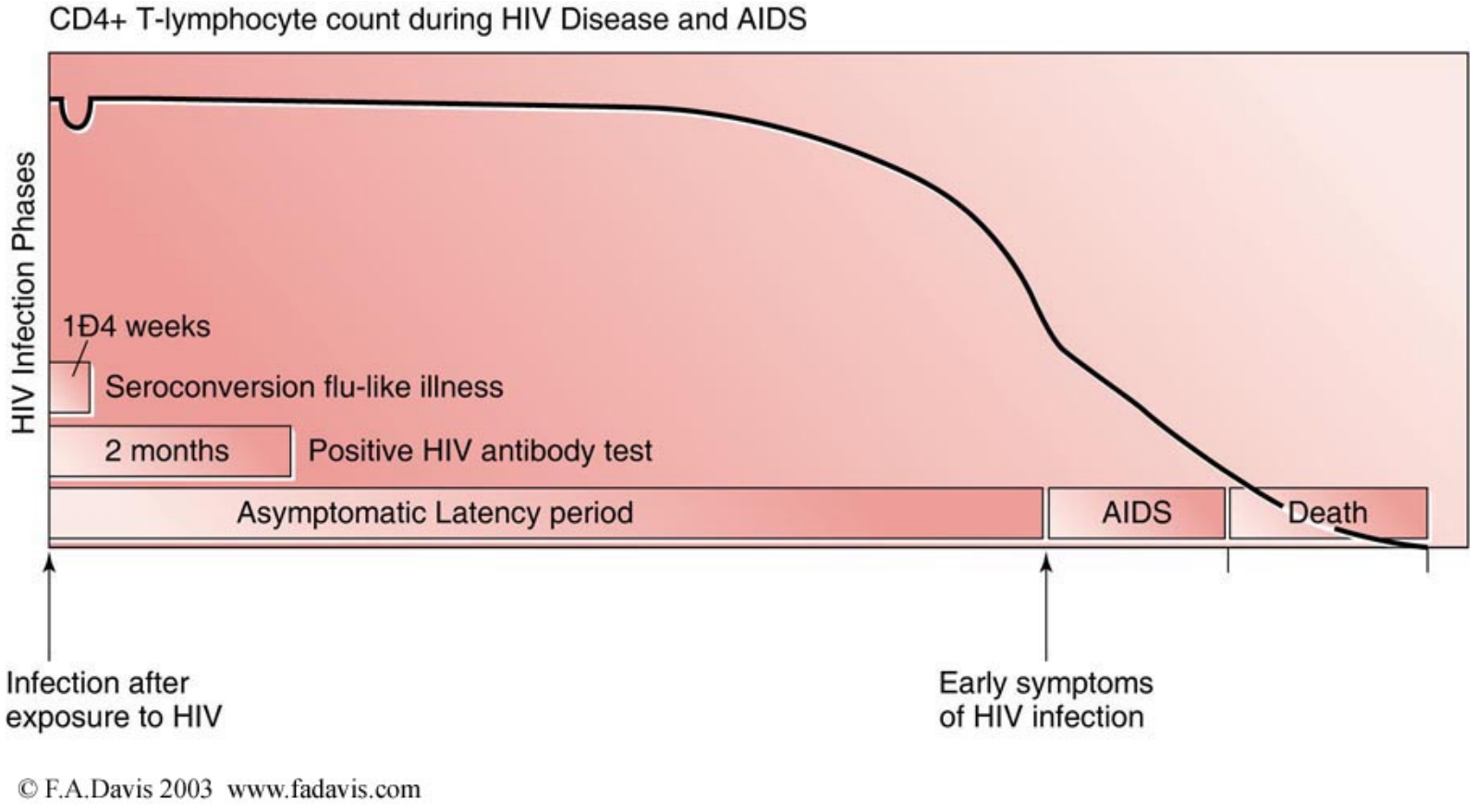
Pathophysiology (cont.)

- HIV attracted to cells w/CD4 receptor
  - Lymphocytes
    - CD4+ T lymphocytes
      - Cease performing immune functions
      - Start replicating HIV
        - » Cells are then destroyed
    - T4 lymphocytes
    - Helper T lymphocytes

Pathophysiology (cont.)

- Acute retroviral syndrome
  - After initial HIV exposure
    - Develop mononucleosis-like syndrome
      - Fever, rash, joint pain, Lymphadenopathy, malaise)
    - Immune system forms antibodies to fight HIV
      - Typically present within 3 weeks to 3 months
      - Pt considered “HIV positive”

Pathophysiology (cont.)



Progression

- Initial infection
- Latency stage
  - Relatively asymptomatic period
  - Virus remains & reproduces in lymph nodes, liver, spleen
  - CD4+ T lymphocytes continue to decrease
- HIV infection
  - Period from infection to onset of symptoms
- AIDS
  - Severely weakened immune system
  - Opportunistic infections & cancer occurs

Prevention

- Prevention/education best to manage HIV/AIDS
- Mode of transmission
  - Infected blood, semen, vaginal secretions, breast milk
  - Not spread casually

Prevention

Counseling

- Per CDC guidelines by trained personnel
  - For persons at risk
  - Goal is to assist in making informed decision
  - Posttest counseling
    - To help pt understand results
    - How to inform sexual contacts/needle drug sharers
    - Risk factor reduction
    - Care options

Prevention

Sexual Transmission

- HIV transmitted more easily to women
  - Greater amount mucous membranes
  - Greater amount virus in semen
- Safer sex practices
  - Abstinence
  - Mutual monogamy w/o prior infection
  - Alternate sexual activities among infected pts
  - Condoms/dental dams

Prevention

Parenteral Transmission

- Avoid injection drug use
- Do not share needles
  - If unable or unwilling
    - Proper cleansing of equipment
      - Use of bleach
- Autologous blood tranfusion

Prevention

Perinatal Transmission

- U.S. Public Health Service Guidelines recommend
  - Voluntary HIV pretest counseling and testing be offered for all pregnant women
- Pregnant women w/HIV
  - Reduce risk of perinatal transmission
    - Zidovudine during pregnancy, labor and delivery

Prevention

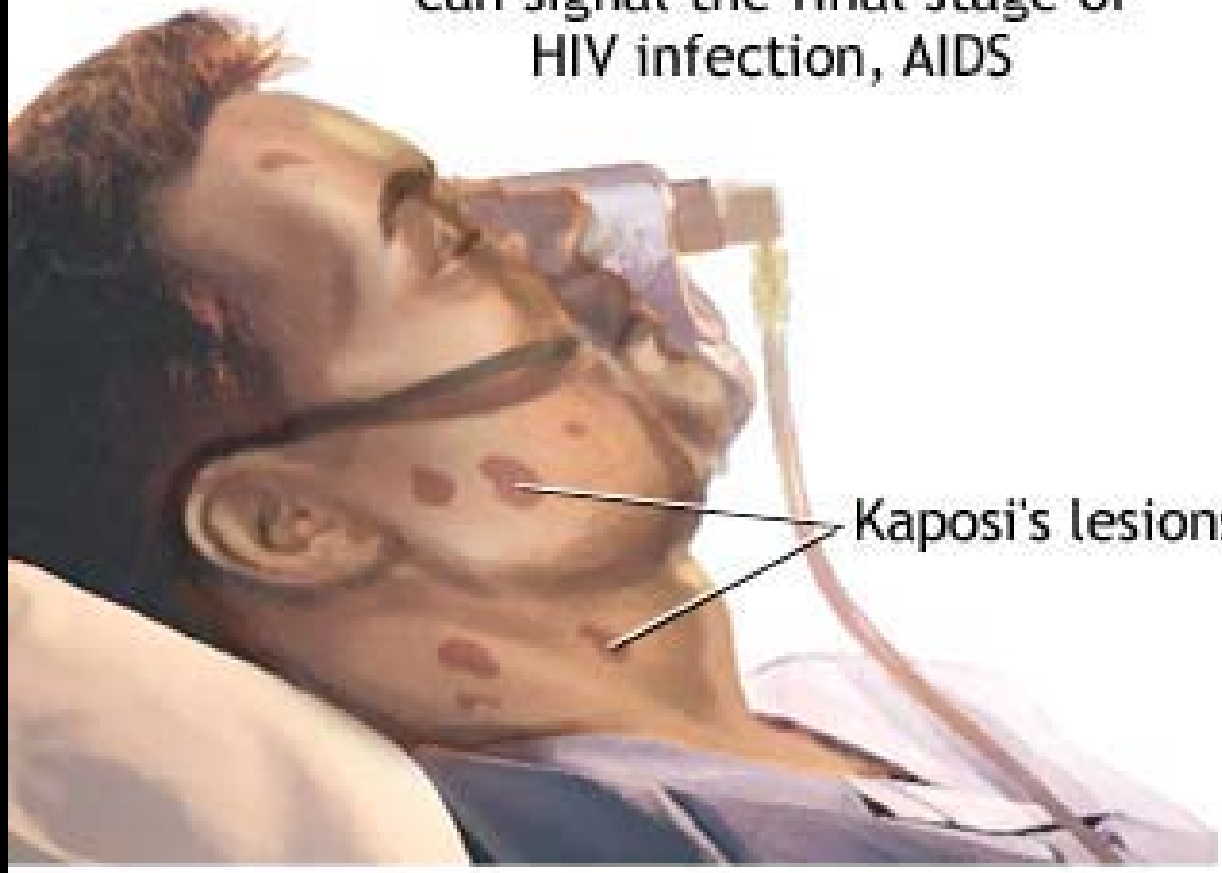
Health Care Workers

- Needlestick Safety & Prevention Act
  - Designed to help health care workers
    - Prevent needle stick injuries
  - Careful needle use
    - Recapping
    - Needleless systems/needle safety devices
  - Post-exposure prophylaxis
- CDC standard precautions
  - Use for all pts

Signs and Symptoms

- Initially
  - Asymptomatic
  - Mononucleosis-like syndrome
    - Fatigue, headache, fever, lymphadenopathy, diarrhea, sore throat
    - Generally develop 6-12 weeks after exposure
    - May last few days to weeks
- Later (Symptomatic stage)
  - Severely impaired immune system
  - Shortness of breath, fever, weight loss, fatigue, night sweats, persistent diarrhea, oral/vaginal candidiasis, dry skin, skin lesions, peripheral neuropathy, shingles, seizures, dementia
- Final stages
  - AIDS: Opportunistic infections/diseases

Opportunistic infections such as pneumocystosis or malignancies such as Kaposi's sarcoma can signal the final stage of HIV infection, AIDS



Complications

- Vary patient to patient
- AIDS wasting syndrome
  - Involuntary weight loss > 10%
  - Chronic weakness, fever > 30 days or chronic diarrhea of 2 loose stools qd > 30 days
  - Contributing factors
    - ↓ appetite, oral lesions
    - Altered metabolism, malabsorption
    - GI infections, diarrhea, med SE
    - Impaired cognition

Complications
Opportunistic Infection/Cancer

- Due to impaired immune system
- Pt with HIV cannot fight infections or cancers that people with healthy immune systems can
- Other types of infections that occur in pts with healthy immune systems are also seen – such as Tb

Complications
Opportunistic Infection/Cancer

- *Candida Albicans*
  - Fungus normal to GI tract
  - In AIDS – overgrowth
    - Mouth/Esophagus
    - Vaginal
  - Signs & symptoms
    - Pain in affected area
    - Dysphagia
    - Yellow-white plaques (resemble cottage cheese)
    - Severe itching

- candidiasis

Fig. 3 Candidiasis of the palate

Complications
Opportunistic Infection/Cancer

- Cytomegalovirus (CMV)
  - Common viral infection
  - Symptoms depend on area affected
    - Cytomegalovirus retinitis
      - Most common area affected
        - » Infection of eye
        - » Visual impairment from little → complete blindness

Complications
Opportunistic Infection/Cancer

- *Pneumocystis carinii pneumonia (PCP)*
  - Fungal infection
  - Signs & symptoms
    - Dyspnea, fever, nonproductive cough, fatigue
  - Prevention
    - Septra® or Pentam® prophylactically
  - Treatment
    - Oxygen
    - Oral/IV Septra®
    - IV Pentam®
    - Steroids – to reduce lung inflammation

Complications
Opportunistic Infection/Cancer

- *Tuberculosis*
  - May occur 10% of all AIDS pts
  - Signs & symptoms
    - Dyspnea. Cough, chest pain
    - Fever, night sweats, weight loss
  - PPD skin test
    - At least annually in pts w/HIV
    - Positive result
      - 5mm or more induration (in HIV)
      - 10mm or more (at risk pts)
      - 15mm or more (immunocompetent)

Complications
Opportunistic Infection/Cancer

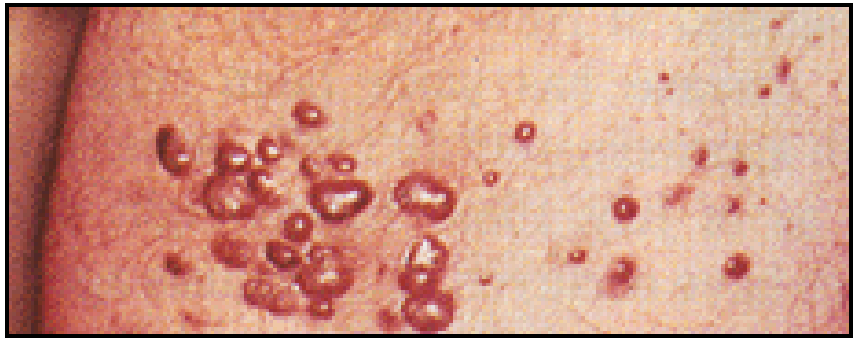
- Viral Infections
  - Herpes simplex (oral, genital, rectal)
    - Blisterlike lesions
    - Ulcerations
    - Fever, pain or bleeding
  - Varicella zoster
    - Reactivation of same virus causing chickenpox
      - Shingles

- Herpes simplex virus

- Shingles; varicella zoster virus

Complications
Opportunistic Infection/Cancer

- Kaposi's sarcoma
  - Most common cancer seen in AIDS
  - Signs & symptoms
    - Painless, small, non-blanching purple-blue lesions
      - Can occur anywhere on body
      - May scale, ulcerate, bleed
  - Treatment
    - Bleomycin
    - Cryotherapy
    - Radiation



Kaposi's sarcoma on the trunk and leg of a patient with AIDS

Complications

AIDS Dementia Complex (ADC)

- HIV infection of the brain
- Signs & symptoms
  - Mild to severe
  - Memory impairment, personality changes, hallucinations
  - Leg weakness, loss of balance, slow responses

Diagnosis

HIV Antibody tests

- Enzyme-linked immunosorbent assay (ELIZA)
  - Detects antibodies in blood to HIV antigen
  - If positive, test repeated
    - False positives can occur (0.1%)
  - Positive 2nd time
    - **Western blot test** done
      - Detects presence of antibodies to 4 major HIV antigens
      - Positive if 2 antibodies present
- If all tests positive → pt HIV positive

Diagnosis

HIV Antibody tests

- Rapid HIV testing
  - Results same day
- Home sample collection devices
  - Sample sent to a lab for testing
  - Confidential
  - Pt calls for results, counseling and referral if necessary

Diagnosis

CBC/Lymphocyte Count

- Common hematological disorders in AIDS
  - Leukopenia
  - Lymphopenia
  - Anemia
  - Thrombocytopenia
- Usually due to complication of antiretroviral therapy

Diagnosis

CD4+/CD8+ T-Lymphocyte Count

- Normal CD4+ levels
  - 500 – 1600 cells/mm^3
- HIV
  - CD4+ cells drop
  - CD8+ cells do not
  - As a result CD4+ to CD8+ ratio will ↓
    - As disease progresses
- CD4+/CD8+ T-lymphocyte counts
  - Performed at 4 month intervals

Diagnosis
Viral Load Testing

- Measures amount HIV RNA in pt plasma
  - Determines prognosis and response to therapy
  - Combination retroviral therapy
    - Can decrease total body HIV levels by 50% within a few days
  - Performed
    - One month after initiation of new therapy
    - Four month intervals thereafter

Medical Treatment

- Goal
  - Prevent/delay
    - Opportunistic diseases
    - Remain free from infection
- Antiretroviral drugs recommended:
  - CD4 count < 350 cells/mm
  - Prophylactic treatment for opportunistic dx
    - Esp: hepatitis A & B, herpes, PCP
    - Aim to ↑ life expectancy & ↓ long term cost

Medical Treatment (cont.)

Antiretroviral drugs/treatment strategies

1. Prevention of attachment of virus to CD4 receptor
2. Interference with viral “uncoating”
3. Inhibition of reverse transcriptase
4. Blockade of viral regulatory and transactivating proteins
5. Protease inhibition
6. Prevention of viral assembly & budding out of cell

Medical Treatment (cont.)
Highly Active Antiretroviral Therapy

- "Cocktails"
  - Multiple antiretroviral drugs (i.e., HAART)
    - Results in prolonged survival
      - Reduced viral loads in bloodstream
      - Increased CD4 T lymph counts
    - Helps reduce drug resistance (common cause of drug failure)

Medical Treatment (cont.)

Nucleoside Analog Reverse Transcriptase Inhibitors

- Inhibit production of reverse transcriptase
- Inhibit viral replication
- Examle
  - Abacavir (Ziagen)
  - Zidovudine (Retrovir)

Medical Treatment (cont.)

Non-Nucleoside Reverse Transcriptase Inhibitors

- High affinity for active site of HIV
  - Blocking reverse transcriptase
- Best in combo regimens
  - Pts who have not received prior therapy
- Examples
  - Delavirdine (Rescriptor)
  - Efavirenz (Sustiva)

Medical Treatment (cont.)

Protease Inhibitors

- Bind to active site of HIV protease enzyme
- Interrupt the formation of mature viral particles
- Reduce viral replication ~ 99%
- Used as part of cocktail
  - Along with nucleoside analogs
- Examples
  - Amprenavir (Agenerase)
  - Nelfinavir (Viracept)

Medical Treatment (cont.)

Nucleotide Reverse Transcriptase Inhibitors

- Newest drug approved for combo tx
  - For pts on prior therapy
- Blocks reverse transcriptase
- Has a longer action
  - Taken once daily – same time w/full meal
- Example
  - Tenofovir disoproxil fumarate (Viread)

Nursing Management

- Assessment
- Nursing diagnosis
  - Impaired gas exchange
  - Pain
  - Fatigue
  - Imbalanced nutrition: Less than body requirements
  - Impaired skin integrity
  - Social isolation
  - Deficient knowledge
- Implementation
- Evaluation