

# HIV & AIDS



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# HIV & AIDS



- Over 25 million people have died of AIDs
- Over 40 million people are living with AIDS
- Human
- Immunodeficiency
- Virus

# WHAT IS HIV



- “Human Immunodeficiency Virus”
- A unique type of virus (a retrovirus)
- Retro means “reverse” or backwards
- Retroviruses make their genetic material in reverse of other organisms
- Invades the helper T cells (CD4 cells) in the body of the host (defense mechanism of a person)
- Threatening a global epidemic.
- Preventable, manageable but not curable.

# OTHER NAMES FOR HIV



- Former names of the virus include:
  - Human T cell lymphotropic virus (HTLV-III)
  - Lymphadenopathy associated virus (LAV)
  - AIDS associated retrovirus (ARV)

# Initial HIV Infection



- It is common to develop a brief flu-like illness 2 to 6 weeks after becoming infected with HIV
- Illness caused by initial HIV infection
  - Primary Infection
  - Sero conversion syndrome

# Sero-conversion syndrome Symptoms



- Primary Infection
- Flu-like illness within a month or 2 after virus enters body
- Fever
- Muscle soreness
- Rash
- Headache
- Sore throat
- Mouth or genital ulcers
- Swollen lymph glands, mainly on the neck

# HIV Sero-conversion rash



# HIV Destroys Immunity



- Some primary HIV infections may be mild and have no symptoms
- Viral load in blood stream is high at this time
- HIV infection spreads more efficiently during primary infection than during the next stage of infection
- Body is not able to get rid of the virus, immune system comes under attack
- Persistent swelling of lymph node during clinical latent infection. Virus begins to destroy T helper cells (CD4 lymphocytes)



# Dormant Phase



- Clinical latent infection typically lasts 8 to 10 years
- Still able to transmit virus to others
- Some stay in dormant stage for longer
- Others progress to more-sever disease much sooner

# Early AIDS



- Over the years the virus multiplies and destroy immune cells
- One may develop mild infections or chronic symptoms e.g
- Fever
- Swollen lymph nodes
- Cough & shortness of breath
- Diarrhoea
- Weight loss

# Progression to AIDS- Last phase



- Disease typically progress to AIDS in about 10 years
- More serious symptoms begin to appear –infection may them meet official AIDS definition
- Defined by presence of HIV infection as shown by +HIV Ab test plus one of the following
  - 1) Development of an opportunistic infection
  - 2) CD4 lymphocyte count of  $\leq 200$  (normal 600 – 1000)

# Symptoms of Infection



- Soaking night sweats
- Shaking chills or fever  $> 38^{\circ}\text{C}$  for several weeks
- Dry cough & shortness of breath
- Chronic diarrhoea
- Persistent white spot on tongue or in mouth
- Headaches
- Blurred and distorted vision
- Weight loss
- Skin rashes or bumps

# AIDS Associated Disease Categories



1. **Gastrointestinal:** Cause most of illness and death of late AIDS.

## Symptoms:

- Diarrhoea
- Wasting (extreme weight loss)
- Abdominal pain
- Infections of the mouth and esophagus.

**Pathogens:** *Candida albicans*, cytomegalovirus, Microsporidia, and Cryptosporidia.

# AIDS Associated Disease Categories



**2. Respiratory:** 70% of AIDS patients develop serious respiratory problems.

Partial list of respiratory problems associated with AIDS:

- ✦ Bronchitis
- ✦ Pneumocystitis pneumonia
- ✦ Tuberculosis
- ✦ Lung cancer
- ✦ Sinusitis
- ✦ Pneumonitis

# AIDS Associated Disease Categories



3. **Neurological:** Opportunistic diseases and tumors of central nervous system.

Symptoms many include:

- Headaches,
- Peripheral nerve problems, and
- *AIDS dementia complex* (Memory loss, motor problems, difficulty concentration, and paralysis).

# AIDS Associated Disease Categories



**4. Skin Disorders:** 90% of AIDS patients develop skin or mucous membrane disorders.

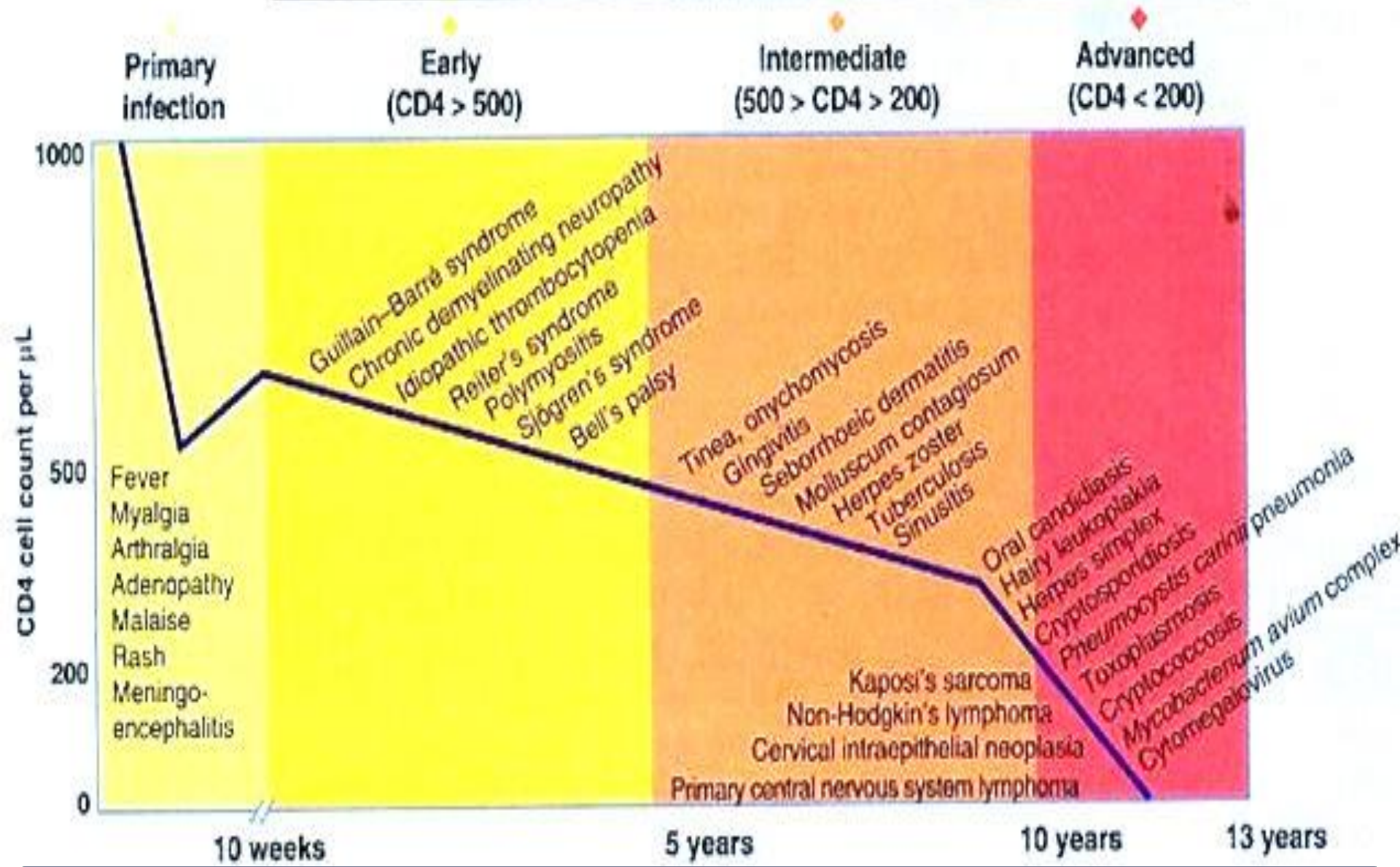
- ✦ Kaposi's sarcoma
  - 1/3 male AIDS patients develop KS
  - Most common type of cancer in AIDS patients
- ✦ Herpes zoster (shingles)
- ✦ Herpes simplex
- ✦ Thrush
- ✦ Invasive cervical carcinoma

**5. Eye Infections:** 50-75% patients develop eye conditions.

- ✦ CMV retinitis
- ✦ Conjunctivitis
- ✦ Dry eye syndrome



# Immune deficiency

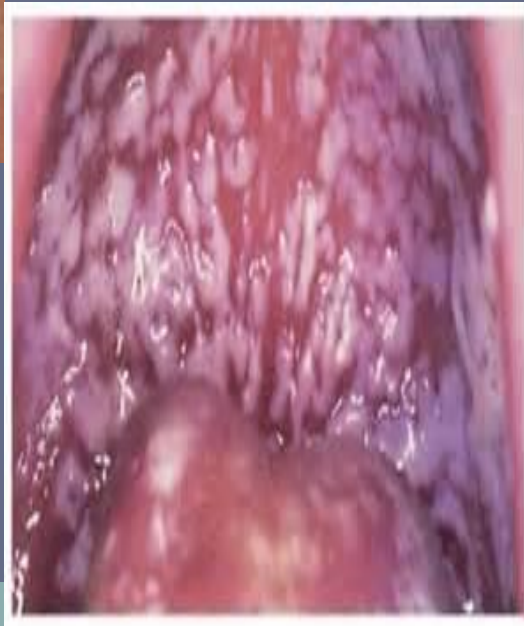


# Karposi's sarcoma





# Oral Candidiasis



# CMV retinitis, Herpes Simplex/Shingles,



HIV Web Study ([www.HIVwebstudy.org](http://www.HIVwebstudy.org))

Supported by NRSAs



# Occurance



- AIDS was first recognized as a distinct clinical entity in 1981; however, isolated cases appear to have occurred during the 1970s and even earlier in several areas (Africa, Europe, Haiti, USA).
- Of the estimated 40 million persons (34–46 million) living with HIV infection or AIDS (HIV/AIDS) worldwide in 2003, the largest elements were estimated at 25–28.2 million in sub-Saharan Africa, 4.6–8.2 million in south and southeastern Asia, 13–1.9 million in Latin America and 800 000–1 million in North America

# Reservoir

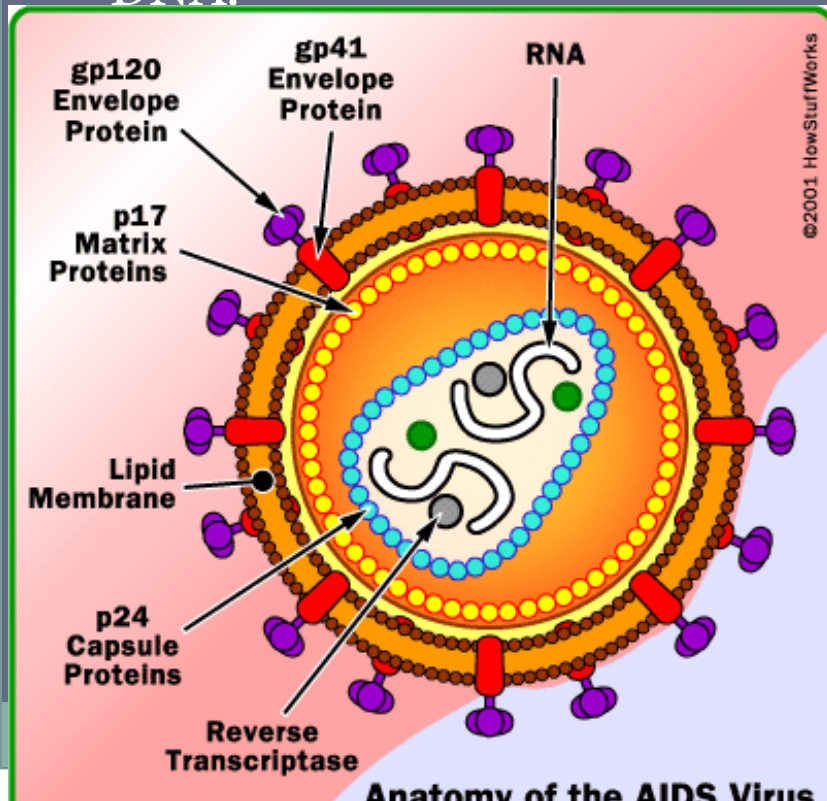


- Humans.
- HIV is thought to have recently evolved from chimpanzee viruses.
- HIV-1 is the most prevalent HIV type throughout the world;
- HIV-2 has been found in Africa

# Structure of HIV

- Icosahedral (20 sided), enveloped virus of the lentivirus subfamily of *retroviruses*.
- Retroviruses transcribe RNA to DNA.

- Envelope phospholipid Bilayer
- Envelope attachment spikes
  - Attachment spikes  
Glycoproteins gp120, gp41
  - Matrix gp17 protein
  - Viral core Capsid
  - Viral RNA
  - 3 types of enzymes
    - Reverse transcriptase
    - Protease
    - Integrase



# Structure of HIV



- Reverse transcriptase (RT) takes the viral RNA(+) and makes a matching reverse RNA (-) which together make the viral DNA
- Integrase (I) integrates the viral DNA into the human DNA
- Protease (P) cleaves large proteins into smaller pieces necessary for assembly of new viruses and their exit



# Mode of Transmission

Free from SILENCE, Free from HIV/AIDS

## You CAN



eat together



work together



shake hands

## And NOT get HIV



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# Modes of Transmission



- Person to person transmission through unprotected (heterosexual or homosexual) intercourse;
- Contact of abraded skin or mucosa with body secretions such as blood, CSF or semen;
- The use of HIV-contaminated needles and syringes, including sharing by intravenous drug users; transfusion of infected blood or its components
- Transplantation of HIV-infected tissues or organs.
- The presence of a concurrent sexually transmitted disease, especially an ulcerative one, can facilitate HIV transmission.

# Mode of transmission



- Unprotected intercourse (no condom— unprotected sex) with many concurrent or overlapping sexual partners.
- HIV can be transmitted from mother to child (MTCT or vertical transmission).
  - From 15% to 35% of infants born to HIV-positive mothers are infected through placental processes at birth.
  - HIV-infected women can transmit infection to their infants through breastfeeding and this can account for up to half of mother-to-child HIV transmission.
  - Giving pregnant women antiretrovirals such as zidovudine results in a marked reduction of MTCT.

# Mode of transmission



- After direct exposure of health care workers to HIV-infected blood through injury with needles and other sharp objects, the rate of seroconversion is less than 0.5%, much lower than the risk of hepatitis B virus infection after similar exposures (about 25%).
- Unsafe injections may account for up to 5% of transmission.

# Mode of transmission



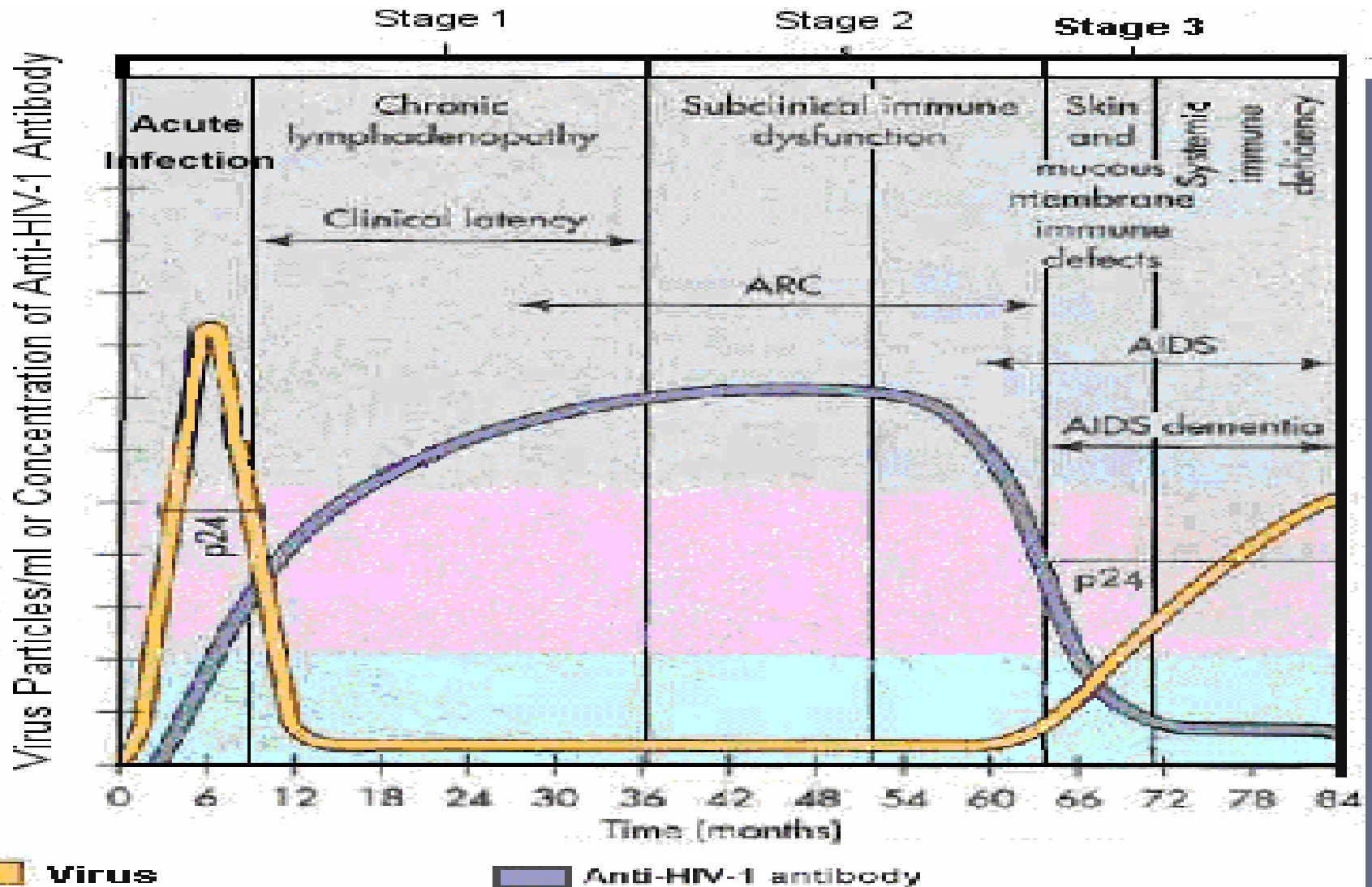
- While the virus has occasionally been found in saliva, tears, urine and bronchial secretions, transmission after contact with these secretions has not been reported.
- No laboratory or epidemiological evidence suggests that biting insects have transmitted HIV infection.

# High risk Indicators



- Have unprotected sex with someone who has any of the risk factors below
- Have another STI- many STI's produce open sores on your genitals which act as doorways for HIV
- Receive blood transfusion or clotting factor during 1978 - 1985

# Course of HIV Infection



# Laboratory tests



- HIV Antigen test p24 – protein produced by the virus immediately after infection.
- Plasma HIV RNA – measures amount of virus in the blood (viral load)
- CD4 Count – determines health of the immune system
- Genotype/Phenotyping/ Resistance
  - determines whether the strains of HIV will be resistant to certain anti-HIV medications



# Other Initial Test



- Complete blood count
  - Chemistry profile
    - Liver enzymes
- RPR or VDRL (Syphilis)
  - Tuberculin Skin Test
  - Toxoplasma gondii IgG
  - Hep A, B & C serologies
  - Chlamydia, gonorrhoea
    - PAP smear in women

# HIV Medications



- Are used to control the reproduction of the virus and to slow down the progression to HIV disease
- Although can suppress HIV to undetectable levels, they do not rid the body entirely of HIV
- No known immunisation has been found effective

# Five Major Classes of Antiretrovirals



- 1) Nucleoside Reverse Transcriptase Inhibitors (NRTI's)
- 2) Non Nucleoside Reverse Transcriptase Inhibitors (NNRTI's)
- 3) Protease Inhibitors (PI's) - Inhibits viral proteases. Prevent viral maturation
- 4) Fusion Inhibitors (Entry Inhibitors)
- 5) Integrase Inhibitors (about 4 yrs ago)
- The recommended Px is combination of 3 or more medications called Highly Active Anti Retroviral Therapy (HAART)

# HAART



- 1) 2 NRTI's plus either
  - PI with ritonavir booster or
  - NNRTI
- 2) Ritonavir Boosting
  - Protease inhibitor which interferes with the breakdown of other protease inhibitors, therefore boosting the efficacy of other protease inhibitor

# HAART



- Tenofovir/Emtricitabine (dual NRTI)
- Efavirenz (NNRTI)
  
- Tenofovir/Emtricitabine (dual NRTI)
- Atazanvir (PI) with ritonavir boosting

# When to start treatment



- Current guidelines – begin treatment if:
- Severe symptoms
- CD4 count is under 500
- Pregnant
- Have HIV – related kidney disease
- Being treated for hepatitis B
  
- **NO HIV MONOTHERAPY** – leads to resistance and treatment failure

# Prevention



## **A. *Preventive measures:***

- HIV/AIDS prevention programs can be effective only with full community and political commitment to change and/or reduce high HIV-risk behaviours.
- Public and school health education must stress that having multiple and especially concurrent and/or overlapping sexual partners or sharing drug paraphernalia both increase the risk of HIV infection.

# Prevention



- The only absolutely sure way to avoid infection through sex is to abstain from sexual intercourse or to engage in mutually monogamous sexual intercourse only with someone known.
- In other situations, latex condoms must be used correctly every time a person has sexual intercourse.



# Prevention



- All pregnant women must be counselled about HIV early in pregnancy and encouraged to undertake an HIV test as a routine part of standard antenatal care.
- 
- Those found to be HIV-positive take a course of ARV treatment, to reduce the risk of their infant being infected.
- All donated units of blood must be tested for HIV antibody; only donations testing negative can be used.

# Prevention



- People who have engaged in behaviours that place them at increased risk of HIV infection should not donate plasma, blood, organs for transplantation, tissue or cells (including semen for artificial insemination).
- Only clotting factor products that have been screened and treated to inactivate HIV must be used.
- Care must be taken in handling, using and disposing of needles or other sharp instruments.
- Health care workers should wear latex gloves, eye protection and other personal protective equipment in order to avoid contact with blood or with fluids.

# Prevention



- WHO recommends immunization of asymptomatic HIV-infected children with the EPI vaccines; those who are symptomatic should not receive BCG vaccine.
- Live Measles-Mumps-Rubella and polio vaccines are recommended for all HIV-infected children.

# HIV in Ghana

