

VIROLOGY LECTURE

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AIDS

- The end stage of the disease
- Caused by two human retroviruses, termed human immunodeficiency virus types 1 and 2 (HIV 1 & 2).
- These viruses are known to infect cells carrying CD4-molecules mainly T-helper cells and macrophages.
- Destroying T-helper cells results in severe immunologic impairment, leading to multiple opportunistic infections, unusual cancers and death.

Virology:

- The family: Retroviridae is divided into three subfamilies
 - Oncovirinae includes human T-lymphotropic virus types 1 & 2 (HTLV-1 and 2)
 - Lentivirinae includes HIV 1 & 2
 - Spumavirinae

AIDS (Continued)

- HIV consists of an outer envelope covered with glycoprotein spikes.
- And internal core, containing diploid ss-RNA genome and the enzyme reverse transcriptase
- The viral genome has 3-structural genes termed gag-pol-env.
- In addition there are several regulatory genes known as tat, rev, nef, vif, vpr and vpu.

AIDS (Continued)

Transmission:

1. Parenterally

- Direct exposure to infected blood and other body fluids.
- Use contaminated needles and syringes.
- Through contaminated surgical and dental instruments
- Through contaminated instruments used in the practice of tattooing and folk-medicine.
- Sharing contaminated razors and tooth brushes.

2. Sexually:

- By having sexual contact with infected individual
- The virus is present in semens and vaginal secretions

AIDS (Continued)

Transmission:

3. From mother to child

- Mainly perinatally
- About 1/3 of neonates will acquire infection during passage through the birth canal.

Virus Isolation

- HIV has been isolated from blood
 - Blood
 - Semen
 - Vaginal Secretions
 - Saliva
 - Urine
 - CSF
 - Breast milk

Virus Inactivation

- HIV is easily inactivated by treatment for 10 min at 37°C with any of the following
 - 10% house hold bleach
 - 50% ethanol
 - 35% isopropanol
 - 1% NP - 40
 - 0.5% Paraformaldehyde
 - 0.3% hydrogen peroxide

The Course of HIV-infection

- The course of HIV-infection can be divided into three stages:
 - The acute phase
 - The chronic phase
 - AIDS

1. The acute phase

- Characterized by the appearance of HIV-Ag in the blood.
- Two antibodies, one directed to the envelope and the other to the core proteins also appear in the blood.
- Mostly asymptomatic
- Some patients have symptoms resembling infectious mononucleosis, with or without aseptic meningitis.

The Course of HIV-infection

(Continued)

2. The chronic phase

- Characterized by the disappearance of HIV-Ag from circulation and the presence of anti-envelope and anti-core.
- This phase totally asymptomatic
- This phase lasts for about 10-years in adults.
- At the end of this stage, two syndromes appear:
 - Persistent generalized lymphadenopathy (PGL) and AIDS-related complex (ARC)

The Course of HIV-infection (Continued)

A. Persistent Generalized Lymphadenopathy:

- The CDC-definition is:
 - Enlarged lymph nodes at least 1 cm in diameter
 - In two or more extralingual sites.
 - That persists for at least 3-months.
 - In the absence of any current illness or medication known to cause PGL.

The Course of HIV-infection

(Continued)

B. AIDS-related complex (ARC):

- Used to describe patients who have some constitutional symptoms and signs of AIDS, but lack the opportunistic infections or tumours.
- The symptoms of ARC are:
 - Fever persisting more than a month..
 - Chronic diarrhea persisting more than a month
 - Weight loss greater than 10%
 - Fatigue

The Course of HIV-infection

(Continued)

3. AIDS

- The end stage of the disease characterized by:
 - Marked decrease in CD4 T-helper cells
 - Severe immunologic impairment
 - Opportunistic infections
 - Unusual cancers (Kaposi's sarcoma)

Treatment

- Treatment does not eradicate the virus.
- Treatment, should continue all life
- Treatment only inhibits HIV-replication
- The aim of treatment is to maintain the immune system of the treated patient near normal as possible
- Prevent disease progression
- Suppressing HIV-replication
- At the present time the combined therapy is used.
- Three drugs are used, two reverse transcriptase inhibitors plus one protease inhibitor

Treatment (Continued)

A. Reverse Transcriptase Inhibitors:

- AZT Zidovudine
- ddC Zalcitabine
- ddI Didanosine
- d4T Stavudine
- 3TC Lamivudine
- All the above anti-viral drugs are nucleoside analogues.

B. Protease inhibitors

- Saquinavir
- Indinavir
- Ritonavir
- Nelfinavir

Treatment (Continued)

Lab. Diagnosis:

- By detection of both HIV-Ab and HIV-Ag, using EIA (screening test)
- If results are negative, report negative
- If results are positive, repeat the screening test in duplicate
- Repeatedly reactive specimens, must be confirmed by Western blot and HIV-Ag test.
- If results are negative, report negative
- If results are positive, report positive

Treatment (Continued)

Indeterminate results:

- Western blot indeterminate result, means that the test specimen not positive nor negative.
- The individual must be retested after 8-12 weeks.
- If the result is negative, report negative
- If the result is positive, report positive
- If the individual still indeterminate then he or she must be referred to medical evaluation
- The aim of medical evaluation is to look for signs and symptoms suggesting HIV-infection.

Vaccine:

- There is no vaccine available yet for HIV.

Treatment (Continued)

Prevention:

- Practice safer sex by having one sexual partner
 - Do not share razors, tooth brushes, etc
 - Do not share needles and syringes
 - Avoid direct exposure to body fluids
 - Educate the public about HIV-infection.
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