

AIM: \_\_\_\_\_

# Infectious Diseases

## HIV

Def<sup>n</sup>:

Human Immunodeficiency Virus (HIV) is a unique type of virus that invades the T-helper cells in the body of the host characterized by fever, weight loss, Neuropathy.

Ecology:

Signs &amp; symptoms

Systemic - fever, weight loss

Central - Headache, neuropathy

GIIT - Pharyngitis, mouth sores, nausea  
inflammation in throat esophagus sores, vomiting

lymphatic system - lymphadenopathy (swelling)

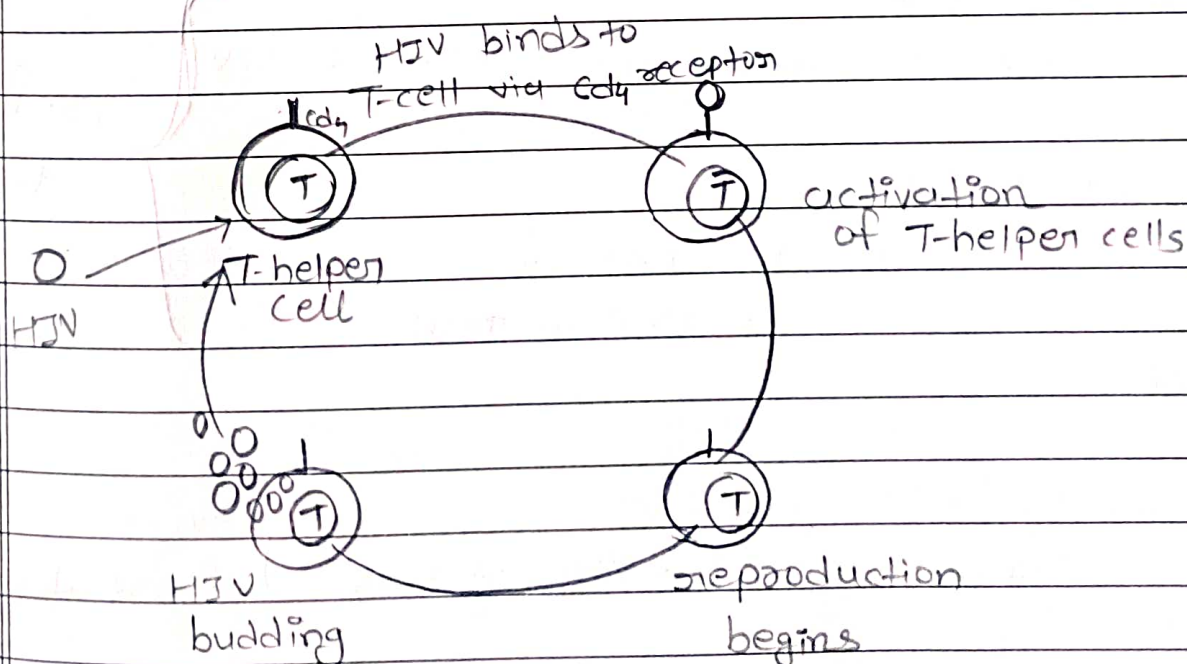
Skin - rash

muscles - myalgia

liver & spleen - enlargement

Retina - Retinitis

Pathogenesis:



- ① Binding : HIV binds to receptors on the surface of CD4 cell.
- ② Fusion : the HIV envelope & CD4 cell membrane join together, which allows HIV to enter CD4 cell.
- ③ Reverse transcription : Inside the CD4 cell, HIV releases and uses reverse transcription to convert its genetic material HIV RNA into HIV DNA.
- ④ Integration : Inside the CD4 cell nucleus HIV releases integrase. HIV uses integrase to insert its viral DNA into DNA of CD4 cell.
- ⑤ Replication : Once integrated into CD4 cell DNA, HIV begins to use the machinery of CD4 cell to make long chains of HIV proteins.
- ⑥ Assembly : new HIV proteins & HIV RNA move to surface of cell & assemble into immature HIV.
- ⑦ Budding : newly formed immature HIV pushes itself out of the host CD4 cell. New HIV releases protease which acts to break up the long protein chains that form immature viruses.

### Diagnosis :

- (1) antibiotic test  
- detect antibodies made against HIV.
- (2) RNA / DNA test  
↓  
Detects viral RNA      ↳ detects copies of viral RNA in DNA
- (3) antibody / antigen test  
- detects antibodies against HIV

} confirmatory test

} recommended first test



AIM: Treatment

There is no cure for AIDS but the medication helps an individual to live a longer & healthier life & also reduce risk of transmission

There are ANTI RETRO VIRAL THERAPY (ART) which is a combination of medications called as 'HIV Regimen'

It slows down HIV replication & help the immune system recover & fight other infection

antiretroviral drugs :

- ① Nucleoside analogue reverse transcriptase inhibitors (NRTIs)
- ② Protease inhibitors (PIs)
- ③ non-nucleoside reverse transcriptase inhibitor (NNRTIs)
- ④ nucleoside reverse transcriptase inhibitor (NtRTIs)
- ⑤ Fusion inhibitors

Biology :

# SYPHILIS

**Def<sup>n</sup>** Syphilis is a systemic sexually transmitted disease caused by *Treponema pallidum* bacterium characterized by changes on cutaneous or mucocutaneous tissue.

## Stages of Syphilis

### ① Primary Syphilis

- early localized stage
- 1 to 3 weeks after *T. Pallidum* lands on skin or mucous membrane
- when spirochetes enters the body it destroy soft tissue & create ulcer



Syphilis chancre on cutaneous or  
which is painless mucocutaneous tissue

- The individuals who get infected by sexual contact develop primary chancre around external genitalia
- The individuals who get infected by physical touch develop primary chancre on hands or other body parts

### ② Secondary Syphilis

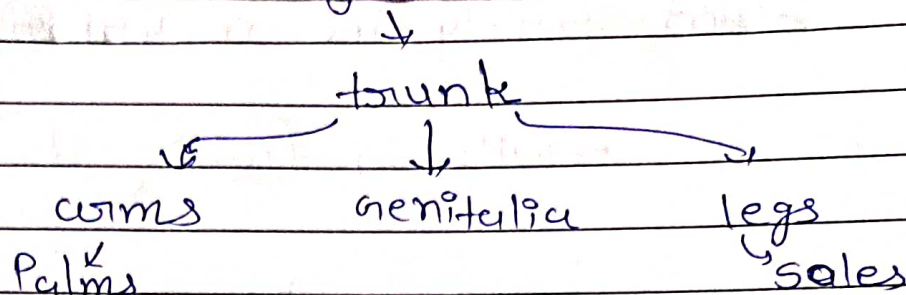
- 6-12 weeks after infection
- during this stage, spirochetes enters the blood stream, called as spirochetemia & causes generalized lymphadenopathy



AIM:

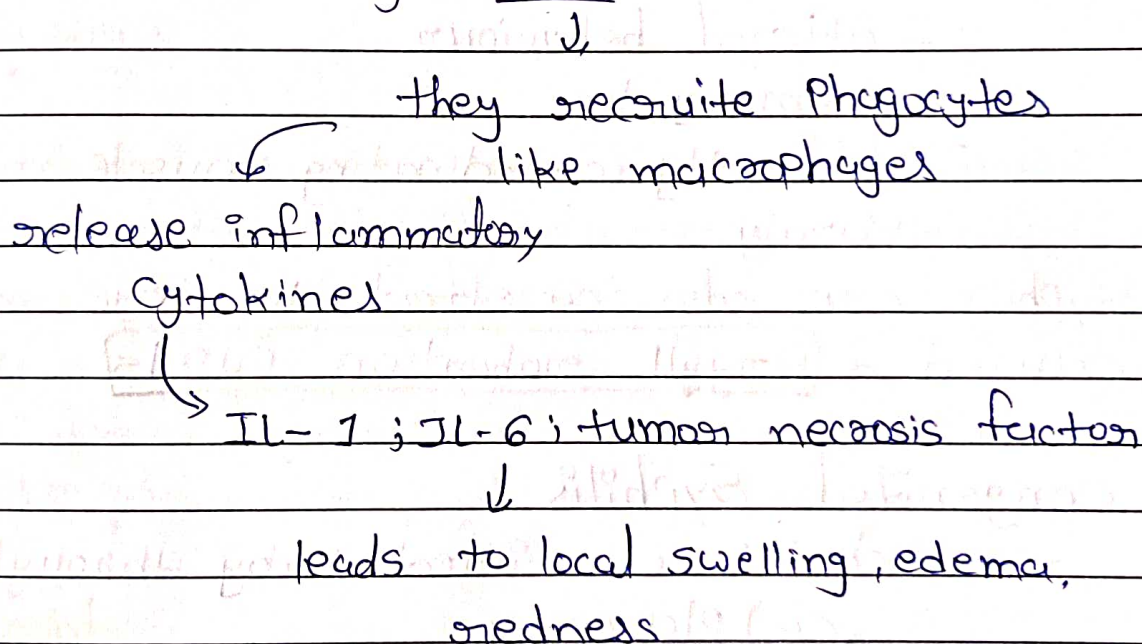
spirochetes attach to the endothelial cells in small capillaries near skin

↳ causes non-itchy rash



### ③ Tertiary Syphilis

— it is type IV hypersensitivity reac<sup>n</sup>, which means that there is an immune response which is lead by T-cells



### ④ Cardiovascular Syphilis

(Heart & blood vessels)

There is endarteritis

↳ inflammation of tiny

arterioles

supplies large arteries like AORTA

block causes  
Vidhata aortitis

↳ inflammation in aorta & these can cause aortic aneurysm

Teacher's Sign.: \_\_\_\_\_

## ⑤ Neurosyphilis

(Brain & spinal cord)

- the spirochetes sets up camp in capillaries that supply the posterior part of spinal cord

↓  
results in Tubes dorsalis  
(loss of back of spinal cord)

```

    ↙           ↘
  loss of vibration  loss of Position
  sensation          sense
  
```

- if spirochetes get into the capillaries serving the brain it can cause:
  - altered behaviour
  - memory loss
  - difficulty coordinating muscle movements
  - Paralysis
- syphilis can also effect the eye with something caused - Argyll Robertson pupils

## ⑥ Congenital Syphilis

- spirochetes can infect baby through
  - a) Placenta
  - b) during Childbirth

- In early disease the result can range between the baby still born or dying within womb to classic features like maculopapular rash

Damage to the eyes optic neuritis

babies can also have organ damage by liver & spleen.

↘  
Palm & Soles



AIM : Pathogenesis

*T. Pallidum* multiplies at the site of initial infection & spreads via lymph to blood.



within 2-10 weeks hard painless ulcer forms  
*chancres*



upto 10 weeks later, secondary lesions appear. these consist of red maculopapular rash, seen on palms & soles.



Both primary & secondary lesions are rich in *T. Pallidum* organisms & are extremely infectious



Secondary lesions may be accompanied by systemic involvement such as syphilitic hepatitis, *inflamm*

*inflamm* of brain & spinal cord membranes, meningitis, nephritis, inflammation of kidney, inflammation of liver

In untreated individuals the disease progresses to tertiary stage

Diagnosis

- ① Non-treponemal tests
  - venereal disease research laboratory test
  - Rapid Plasma reagin test
- ② treponemal antibody test
  - treponemal antigen based enzyme
  - *T. Pallidum* haemagglutination assay
  - *T. Pallidum* Particle agglutination assay
  - Fluorescent treponemal antibody absorbed test

DATE:

: MIA

## Treatment

main treatment for syphilis is Penicillin but in some cases Doxycycline is used

## Caution

when using penicillin it's important to watch out for Jarisch-Herxheimer reaction which is when spirochetes die & break open releasing a lot of antigens.

these make immune system overdrive

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graph TD; A[overdrive] --> B[fever]; A --> C[sweating]; A --> D[muscle & joint pain];
```



AIM:

## GONORRHEA

**Def<sup>n</sup>:** It is a sexually transmitted disease caused by a gram-negative bacteria called Neisseria gonorrhoeae - it is also known as gonococcus <sup>↳ sphere shaped</sup>

**Etiology:** most women have no symptoms & if they have symptoms they appear within 10 days which are: Pain on burning when passing urine, vaginal discharge that is yellow or sometimes bloody, bleeding between menstrual periods, heavy bleeding with periods & pain during sex.

Men & Women with an anal infection have symptoms which include: discharge, soreness, bleeding or itching of the anus & painful bowel movements.

**Pathophysiology:** attack of organism N. gonorrhoeae through sexual contact



attachment to mucosal epithelium is followed by Penetration of N. gonorrhoeae through epithelial cells to the submucosal tissue within 24-48 hours



A vigorous response by neutrophils begins with sloughing of the epithelium, development of submucosal micro abscesses & exudation of Pus further causing symptoms.



stained smears usually reveal large number of gonococci within a few neutrophils, whereas most cells contain no organisms.

### Diagnosis :

swab sample : swab sample from part of body to be infected can be sent to a lab for testing

urine test : gonorrhea in cervix or urethra can be diagnosed with urine sample sent to lab

Gram stain : sample from urethra or cervix is placed on a slide & stained with dye & examined for bacteria under microscope

### Treatment :

- anti biotics
- using culture to identify specific antibiotic that work.
- limit the amount of direct contact during sexual intercourse.

vaginal > condoms  
anal

oral : condoms, dental dams



AIM :

## Urinary Tract Infection

Def<sup>n</sup>

UTI is an infection of urinary tract which is anywhere from the kidneys to ur ureter, bladder & urethra.

etiology :

lower UTIupper UTI

- |  |   |
|--|---|
| - dysuria<br>↳ discomfort when urinating | - Malaise-discomfort                              |
| - Frequency in urination                 | - fever   |
| - Hematuria<br>↳ Blood in urine          | - Vomiting  |
| - Suprapubic discomfort                  | - Rigors  |
| - Burning urgencies                      | - back pain                                       |
| - cloudy urine with offensive smell      | - signs of <u>septicemia</u><br>blood "poisoning" |

pathogenesis:

Bacteria first contaminates the lower urinary tract because of certain risk factors

↓

later they colonizes the urethra and the bladder which triggers an inflammatory response in bladder

↓

Due to inflammatory response the neutrophils are recruited in that area because of various factors, the bacteria multiply and enter the immune system

Teacher's Sign.: \_\_\_\_\_

E. coli can bind to the cells in lower urinary tract & hide from immune cells.



The bacteria forms a Biofilm; (any group of micro-organism in which they stick to each other)



in the UTI progresses on left untreated bacteria can ascend towards the kidney and colonize it, causing an upper urinary tract infection and further causes Bacteriemia leading to septic shock.

### Diagnosis

- If there is discharge or itch along with signs of UTI, consider a swab test of genitals for STDs.
- Urine dipstick which shows:
  - haematuria
  - Proteinuria
  - Presence of nitrites
  - Presence of WBC
- Urine microscopy
- Urine microscopy culture sensitivity (MCS)
- Blood:
  - FBC - complete blood count
  - CRP C-reactive protein
  - B-HCG (ectopic)

Human chorionic gonadotropin

diagnostic growth:  $> 10^5$  CFU/ml



AIM :

Treatment

lower UTI

- oral antibiotics (3-7 day course)
  - Trimethoprim
  - Amoxycillin
  - Nitrofurantoin

• Upper UTI (serious)

- intravenous antibiotics until fever settles
- oral antibiotics.

# Pneumonia

**Def<sup>n</sup>**: An inflammation of lung Parenchyma caused by various microorganism including bacteria, mycobacteria, fungi and viruses leading to shortness of breath, dizziness.

**Pathology**: Systemic - High fever, chills

**Signs &** Central - headaches, loss of appetite, mood swings

**Symptoms** Skin - clammy, Blueness

Vascular - low blood pressure

heart - high heart rate

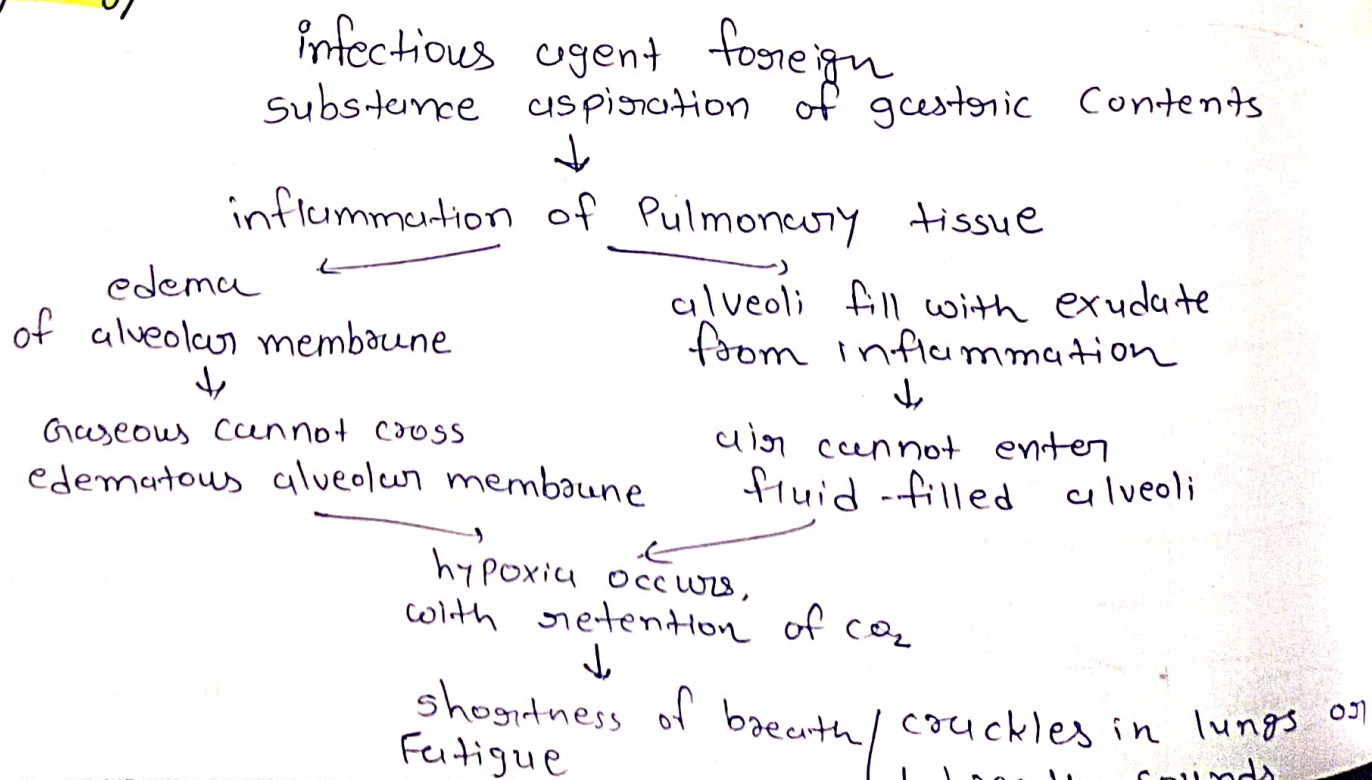
Gastric - Nausea, Vomiting

Joints - Pain

Lungs - cough with sputum, shortness of breath  
chest pain

muscular - fatigue, Aches

**Pathophysiology**:





AIM :

**Diagnosis**

- Person who is working hard to breathe, breathing quickly
- chest x-ray of bronchopneumonia shows patchy areas that are spread throughout the lungs
  - in a typical pneumonia the pattern is also often spread throughout the lungs but is often concentrated in the perihilar region
  - in lobar pneumonia fluid is localized to a single lobe or a set of lobes.
  - dullness to ~~p~~ percussion lung consolidation
  - late inspiratory crackles
  - Bronchial breath sound
  - Bronchophony
  - Egophony

**Treatment**

- ① Depends on severity
- ② anti-biotics
- ③ cough suppressants
- ④ Pain medications