

MENINGITIS PATHOPHYSIOLOGY

Meningitis is an acute inflammation of the protective covering of the CNS (brain & spinal cord), that known as meninges

↳ Inflammation caused by pathogenic infection.

Types -

1) **Viral Meningitis** - Enterovirus category - 85% cases

↳ Coxsackie virus A & B, Echovirus

↳ other - Influenza, mumps, HIV, measles, herpes

2) **Bacterial Meningitis** → Contagious & fatal

* **S. pneumoniae** - most common in infant & children, found in R. Tract, Sinus, & nasal cavity, **Prevented by vaccine**

* **N. meningitidis** - highly contagious, common in upper R. tract infectⁿ, after reach to blood stream it can cause meningitis. "Vaccine"

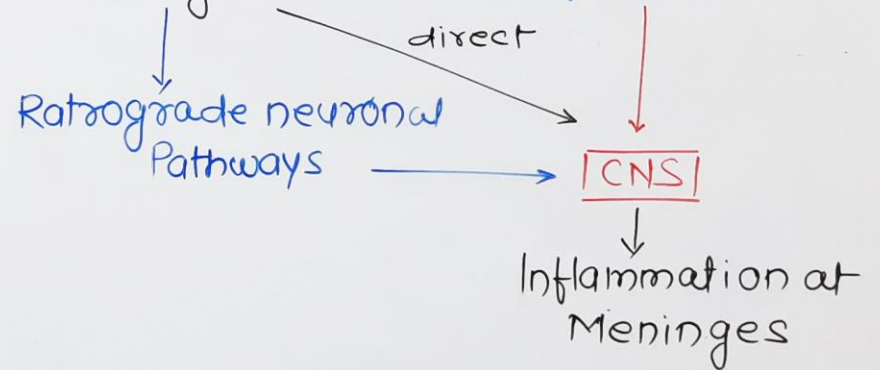
* **H. influenzae - type B - (HIB)** - children

* **L. monocytogenes** - found in unpasteurized cheese, hot dog, & meats. Pregnant woman, newborn & older person.

3) **Others** → Fungal meningitis (Cryptococcal meningitis)
Mycobacterium tuberculosis

Symptoms - Fever, headach, stiff neck, confusion, Seizure, No appetite or thirst, skin rashes,
In baby - Fever, Crying, inactivity, poor feeding, Flu like.

Pathology - Pathogens → Invasion of blood stream



Treatments -

Bac. Meningitis - Antibiotics & Steroids

Viral Meningitis - Symptomatic Treatment

Fungal Meningitis - Antifungal Drugs

Click the icon →



Video Lectures



Website/Notes

TYPHOID PATHOPHYSIOLOGY

Typhoid is a bacterial infection disease caused by "Salmonella typhimurium" which lives in intestine & blood. & Spread through feces.

Transmission -

1. Fecal-Oral Transmission Route -

Infected person → Feces/urine → water/food
↓
Spread Infection ← Taken by normal

2. Typhoid Carriers → Some people carries the bacteria in their intestine, gallbladder, often for years.

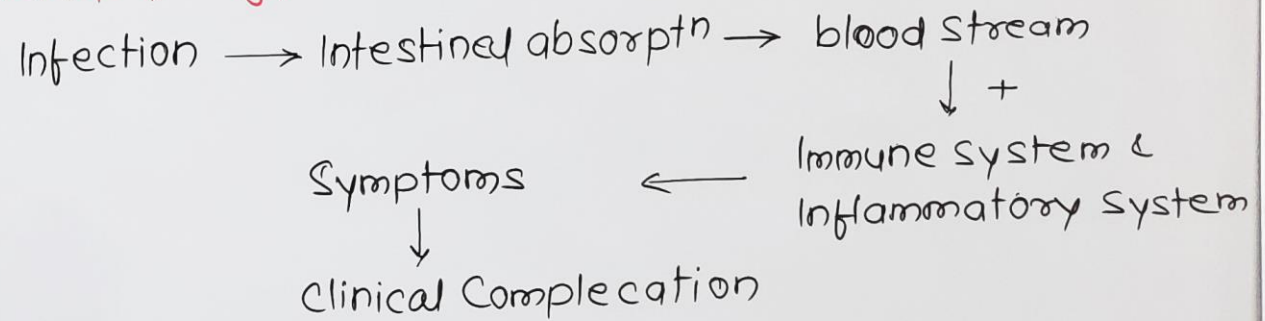
Symptoms →

↳ Early → Fever, headach, weakness, fatigue, sweating, dry cough, Abdominal pain, diarrhoea, Rashes

↳ Later → Lie motionless, exhausted with your eyes half closed

Diagnosis → Detectⁿ of S.typhi via blood, stool, urine

Pathophysiology



Treatments - Antibiotics & Supporting therapy

↳ Antibiotic/AMAs → Ciprofloxacin, Azithromycin, Ceftriaxone, Co-trimoxazole, Ampicilline, Cefotaxime, etc

↳ Supporting Therapy - Fluids, NSAIDs, Antigastric, Multivitamins

LEPROSY PATHOPHYSIOLOGY - HANSEN'S DISEASE

- # Leprosy, caused by "Mycobacterium leprae"
- # It is infective dis. that cause sever, disfiguring skin sores & nerve damage in the arms & legs
- # It has been considered incurable since ages & bears a social stigma. Now availability of drugs it is curable but deformities may not reversed

TYPES: → Based on Ridley-Jopling system, There are six categories (based on severity of symptoms)

1. Intermediate: - A few flat lesions that sometimes heal by themselves & may progress to more severe

2. Tuberculoid: - some large lesions, nerve damage, can be heal itself & may progressive (TT)

3. Borderline Tuberculoid: - lesions are similar to tuberculoid but smaller & numerous; less nerve enlargement; persist; revert to tuberculoid or advance to another form (BT)

4. Mid Borderline leprosy: - Redish plaques, moderate numbness, swollen lymph glands, may regress, persist, or progress to other forms. (BB)

5. Borderline lapromatous: - several types of lesions, persist, regress or progressive. (BL)

6. Lapromatous leprosy: - Many lesions with bacteria, hair loss, nerve involvement, limb weakness, disfigurements, doesn't regress (LL)

SYMPTOMS: - It is primarily a granulomatous disease of the peripheral nerves and mucosa of the upper respiratory tract.

- # Skin lesions - light & dark patches - External Sign
- # Progress → Permanent damage to Skin, Nerve, Limbs, Eyes
- # Secondary Infection → Tissue loss, shortened and deformed toes & fingers.

CLINICAL SIGN & FEATURES

- # Hypopigmented/Erythematous Skin Patches
- # Thickened Peripheral Nerve
- # Acid fast bacilli detected on skin smear or biopsy material

TRANSMISSION: - # Skin, # Nasal mucosa (Resp. Tract)

INCUBATION PERIODS: - Variable (Weeks to Years)

- # minimum → few weeks
- # maximum → 30 Years
- # Avg. → 3 - 10 years

RISK FACTORS: - # Inadequate Bedding

- # Contaminated water & Foods
- # Insufficient Diet
- # Immunocompromised diseases (AIDS, TB)

TARGET CELL → Schwann Cells & Macrophages



Pharmacology Concepts
By Rajesh Houdhary

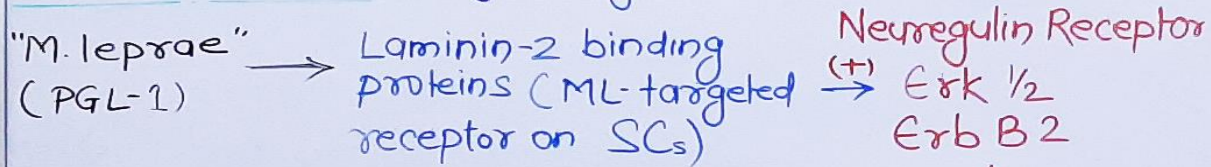


LAPROSY / HANSEN'S DISEASE

- ↳ Mycobacterium leprae, M. lepromatosis
- ↳ Tissue ⇒ Skin & Nerves
- ↳ G.H. Armauer Hansen - discovered M. leprae, 1873

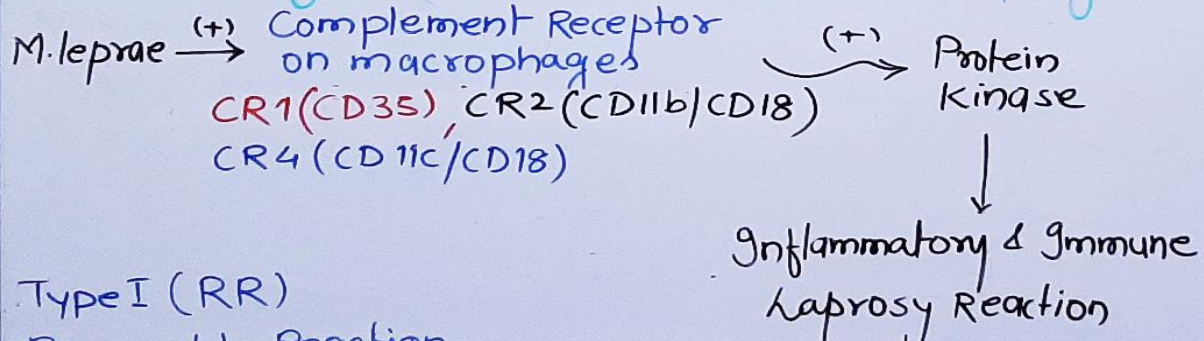
PATHOGENESIS :-

1. Schwann Cells → Major Target area



Disability due to ← Demyelination ← Peripheral Nerve damage
loss of Axonal Conduct^{ts}

2. Macrophages (Monocyte derived macrophages)



Type I (RR)
Reversible Reaction

- ↳ Borderline Tuberculoid (BT)
- ↳ Borderline Lepromatous (BL)

Type II (ENL)
Erythema Nodosum Leprosum

- ↳ Borderline Lepromatous (BL)
- ↳ Lepromatous leprosy (LL)

Type I (RR) → Delayed type Hypersensitivity Reactⁿ

→ CD4 + Lymphocyte → Inflammatory Reactⁿ - Skin, Nerve
INFγ, TNF-β

Edema, Erythema, neuritis, sensory & motor loss, etc

Type II (ENL) → TNFα, IL-1, INFγ, C-reactive protein

Inflammatory Response

Appearance of tender, erythematous, nodules on skin,
Systemic Symptoms - Fever, Enlarged lymph node, Edema,
weight loss, anorexia

TREATMENT = MDT by NLEP (1982)

	<u>MBL</u>	<u>PBL</u>
Rifampin	600 mg/month, supervised	600 mg/month, supervised
Dapsone	100 mg/day, Self	100 mg/day, Self
Clofazimine	300 mg/month, supervised + 50 mg/day, Self	
Duration	12 months	6 months

CHILD - Rifampin - 10 mg/kg/month
Dapsone - 2 mg/kg/day
Clofazimine - 1 mg/kg/day + 6 mg/kg/month



TUBERCULOSIS

TB is an infective disease caused by "Mycobacterium tuberculosis", & that most often affects **the lungs**.

Symptoms → Coughing (with or without mucus & blood), chills, fever, fatigue, weight loss, appetite loss.

Contagious → Spread through air by cough, sneeze or spit

Risk Factors - Compromised immune system, HIV, Diabetes, starvation, Malnutrition, Smokers.

Type of TB Forms -

1) Latent TB - Your immune system stops the spreading and inactivate them but still alive in your body & can become active.

2. Active TB - Microbes can multiply, spread & cause sick.

Clinical Manifestation → spinal pain & joint destruction

↳ Infecting to brain cause **Meningitis**

↳ Infecting to Liver & kidney → functional loss

↳ Infecting to heart → Cardiac Tamponade

PATHOPHYSIOLOGY -

M. tuberculosis → Lung Tissue → Multiplication (1000 - 10000)

Inflammatory Response ← + Immune Response

"Pulmonary Complication" → Spread to other organ
↓
Other Tissue Damage

Treatment → Specific dose regimen of diff. AMAs

↳ 1st line drugs - Isoniazid (H), Ethambutol (E), Rifampin (R), Pyrazinamide (Z), Streptomycin (S)

↳ 2nd line drug → Quinolones, P-amino Salicylate, etc

* Regimen based on RNTCP guideline 2016

New Patient = HRZE (2 months) + HRE (4 months) = 6 months

Previously treated: HRZE (2) + HRE (5) = 8 months
+ HRZE (1)

Daily Single dose (mg/kg): H - 5 mg/kg, R - 10 mg/kg, Z - 25 mg/kg
E - 15 mg/kg, S - 15 mg/kg



URINARY TRACT INFECTION

UTI is an infection in any part of urinary system -
Kidneys, ureters, bladder, and urethra.

↳ Most of UTI occurs in lower urinary tract (urethra, and bladder)

↳ urethra → urethritis

↳ kidneys - Pyelonephritis

↳ Bladder → Cystitis

* Women are at greater risk than men

Pathogen → "E. coli" - 90% cases

Symptom → ↳ Painful urination, burning sensatⁿ

↳ Stronge, persistant urge to urination

↳ Pain at genital & pelvic region

↳ cloudy & pink cola like urination

↳ Strong smell urine

↳ Fever, Vomitting

Risk Factors - ↳ Diabetes ↳ Prostate hypertrophy

↳ Weak Immune system ↳ Kidney stones

Diagnosis - Urine culture for bacteria

urine analysis - Blood cells

CT scan, ultrasound,

Cystoscopy

Treatments

↳ Urinary antiseptics - Nitrofurantoin

↳ Urinary Analgesics - Phenazopyridine

↳ AMAs & Antibiotics

Empirical AMAs (3-5 days) oral dose for Acute UTI

1. Ciprofloxacin → 250-500 mg/12h

2. Ofloxacin → 200-400 mg/12h

3. Cotrimoxazole → 960 mg/12h

4. Cephalexime → 250-500 mg/6h

5. Cefpodoxime → 200 mg/12h

6. Amoxicilline + Clavulanic acid

→ 500 mg + 125 mg / 8 h

7. Nitrofurantoin → 50 mg/8h or 100 mg/12h

* For upper UTI (pyelonephritis) - Same drugs can be given for 2 weeks except Nitrofurantoin



AIDS PATHOPHYSIOLOGY

AIDS - Acquired Immunodeficiency Syndrome

HIV - Human Immunodeficiency Virus

virus → Retro Virus (RNA Virus)

Affected System → "Immune System"

Transmission - Unprotected Sex (STD), Placental, blood transfusion,

Symptoms - Fever, Chills, sore throat, Joint pain, body aches, tiredness, weakness, weight loss.

Late Stage Infection - Blurred vision, Fever (100 F) dry cough, night sweat, shortness of breath, weight loss, esophagitis, infection on CNS, pneumonia, toxoplasmosis, TB, etc.

Treatment -

① Rev. Transcriptase inhibitors - Zidovudine, Lamivudine, Efavirenz, Nevirapine

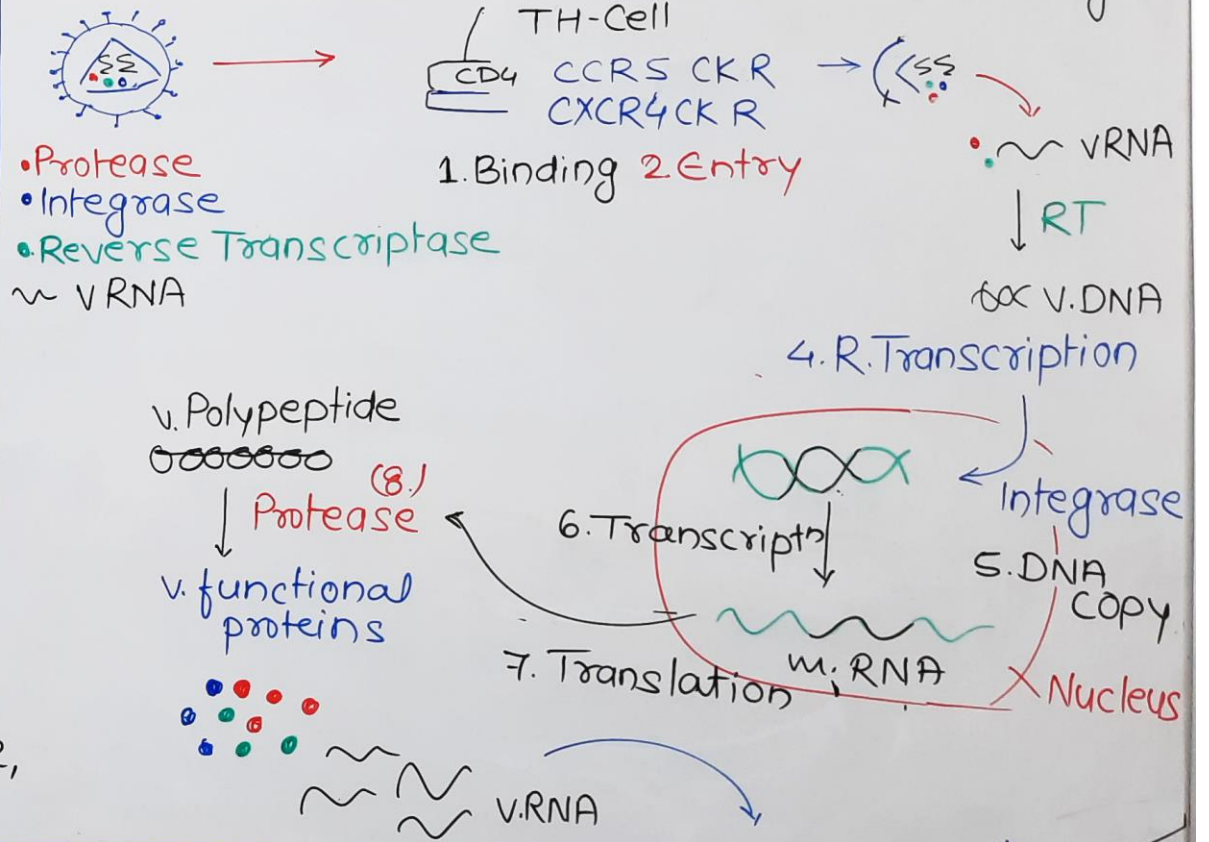
2) Protease Inhibitors - Indinavir, Ritonavir

3) Integrase Inhibitors - Raltegravir

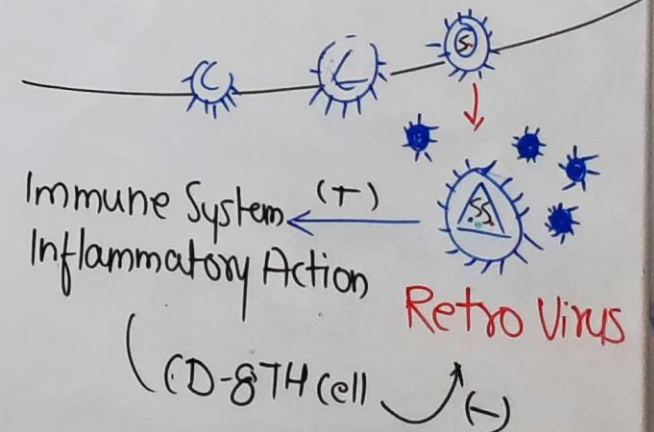
4) Vaccine

5) Entry blocker - Enfuvirtide, maraviroc

PATHOPHYSIOLOGY & VIRAL REPLICATION



* ↓ CD4 count < 350
 ↓ Weaker the immunity
 ↓ ↑ Risk of 2^o infection



SYPHILIS

Syphilis is a bacterial infection, sexually transmitted disease, caused by "**Treponema pallidum**".

Stages of syphilis -

- 1) Primary } most infectious
2) Secondary }
3) Latent - No symp. & contagious
4) Tertiary - most destructive

1) **Primary** - after 3-4 weeks of infection, small & round sore (chancres), painless but infectious

2) **Secondary** - skin rash & sore throat. Symptoms: - headache, fatigue, swollen lymph glands, fever, weight loss, hairfall, joint pain

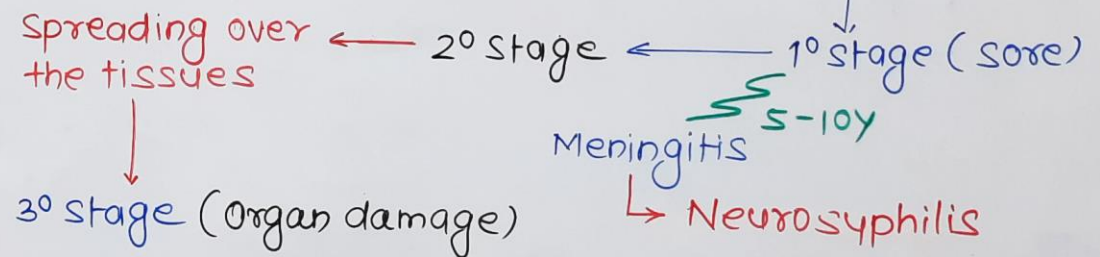
3) **Latent** → latent or hidden stage, no symptoms as 1^o & 2^o, but remain active for years, if no treatment progress to 3^o phase

4) **Tertiary** - late/last stage of syphilis infection (15-30% patients, without treatment), it can occur years or decades after infection.
Life threatening clinical complications - blindness, deafness, mental illness (dementia), destruction of soft tissues & bone, heart disease, neurosyphilis, etc.

Congenital Syphilis - Baby get infected from mother, symptoms - rash, deafness, teeth deformities, etc.

Pathophysiology - Spread through unprotected unsafe sexual activity, blood transfusion, mother to baby, or direct contact with the infected lesions.

T. pallidum → Lymph/Blood — Incubation time 10-90 days (3-weeks)
mucus



Delayed type hypersensitive reaction

Treatments

Early Infection → Penicillin G (1st choice), Doxycycline, tetracycline, Rifampin, clindamycin, Ceftriaxone (Alternative drugs)

Late infection - Neurosyphilis (PenG, IV, large dose, 10 days) - Ceftriaxone, Doxycycline, tetracycline → long duration

Pregnancy - Benzathine Penicillin-G (1m-2.4M unit)



Click the icon →



Video Lectures



Website/Notes

GONORRHOEA

Gonorrhoea is a sexually transmitted disease, caused by bacterial infection (*Neisseria gonorrhoeae*)

Symptoms - Men - burning with urination, discharge from penis, testicular pain

Women - burning with urination, vaginal discharge, vaginal bleeding during periods, pelvis pain & pelvis inflammation

Transmission - sexual contact with infected person, plecental transmission,

Affected site - # Genital Organ

Rectum - Itching, pus discharge, bleeding

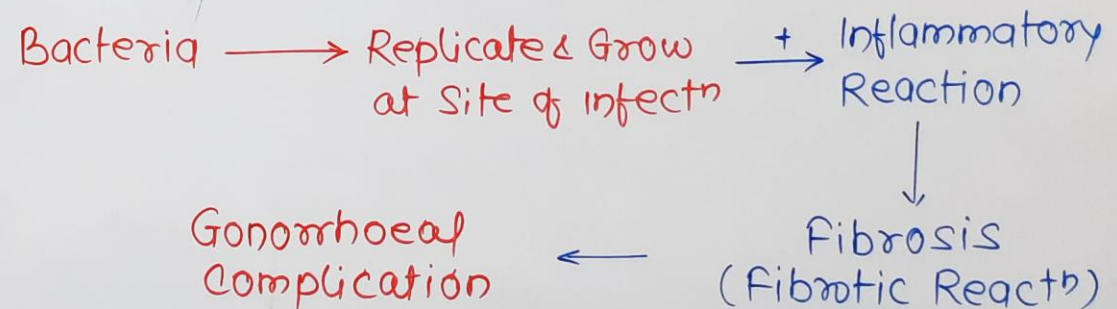
Eye - Pain, discharge

Throat - sore throat, swollen lymph

Joint - Pain, warm, swelling - (Inflammation)

Pathophysiology

N. gonorrhoeae, a gram -ve bacteria having pili which protect from phagocytic action of neutrophil and IgA protease enzyme which digest the IgA that present in urethra, fellopian tube, and endo cervix allowing attachment to these surface.



Treatments - Antimicrobial Agents

↳ Amoxicillin/Ampicillin + Probenecid

↳ Ceftriaxone, Cefuroxime, azithromycin + Probenecid

