ANTI - TUBERCULAR AGENTS

Tuberclosis → Chronic granulomatous disease caused by mycobacterium tuberclosis.

Mycobacterium tuberclosis → Rod shaped bacteria discovered by Robert koch in 1982.

Mycobacterium → Slow growing obligate aerobic bacilli.

Entry through → Inhalation of droplet containing bacilli

Primary affect → Lungs, Occasionally → Tonsil, Skin, bone, Intestine.

SYMPTOMS

→ Weight loss → Evening fever

→ fatigue → Night sweating

→ Weakness → Anorexia [loss of apetite]

→ Chronic Non-productive cough which become productive cough. ~~with~~

RISK FACTOR

Immunosuppressive drugs + other disease →

Rheumatoid Arthritis, Cancer, AIDS and other disease affecting Immunity.

Other Risk factor →

Poor Economy, Illiteracy, Malnutritions.

DIAGNOSTIC METHOD

→ Blood Test → Sputum Analysis

→ Imaging Test → Lungs biopsy

→ Bronchoscopy → Skin Test

→ Skin Test – Mantoux Test or Tuberculin Skin Test

CLASSIFICATION

1. First Line drugs

Isoniazid [H] Ethambutol [E]

Rifampicin [R] Streptomycin [S]

Pyrazinamide [Z]

2. Second Line drugs

Thiocetazone [T] Cycloserine [C]

Paramino Salicylic Acid [PAS] Amikacin [A]

Ethionamide [ET] Kanamycin & Capromycin [K]

3. Newer Drugs

fluroquinolon Linezolid

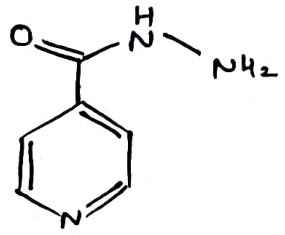
Macrolides Rifapentin

Antibiotics Rifabutin

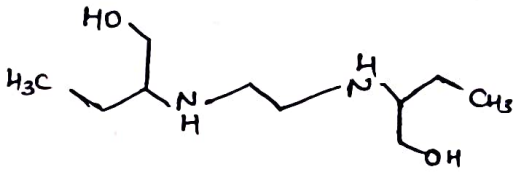
1. First Line Drugs

Synthetic Anti-tubercular Agents

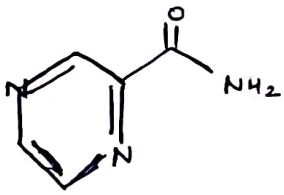
→ Isoniazid



→ Ethambutol

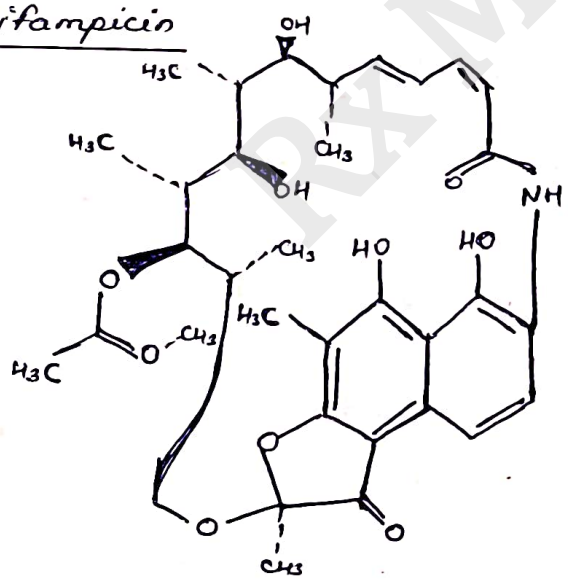


→ Pyrazinamide

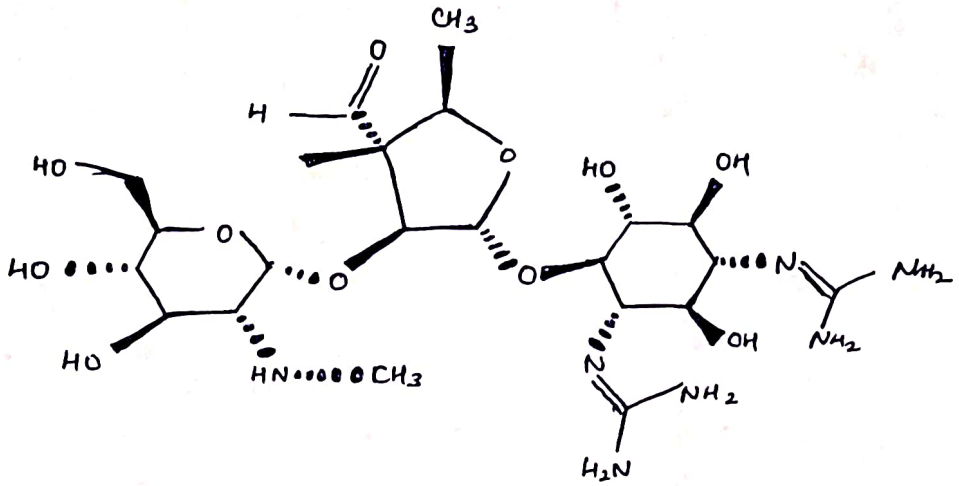


Anti- Tubercular Antibiotics

→ Rifampicin



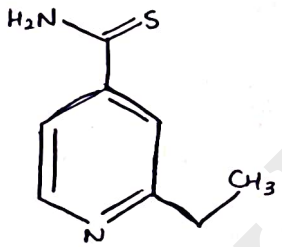
→ Streptomycin



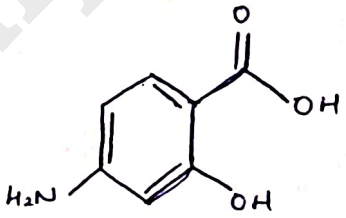
2. Second Line drugs

Synthetic Anti-tubercular Agents

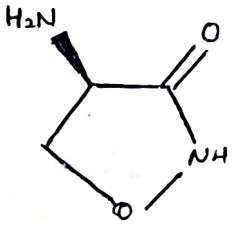
→ Ethionamide

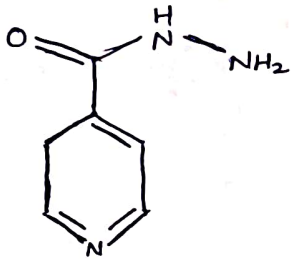


→ Paramino Salicylic Acid

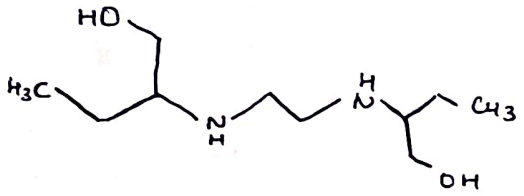


→ Cycloserine

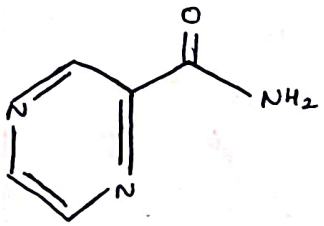




→ Ethambutol

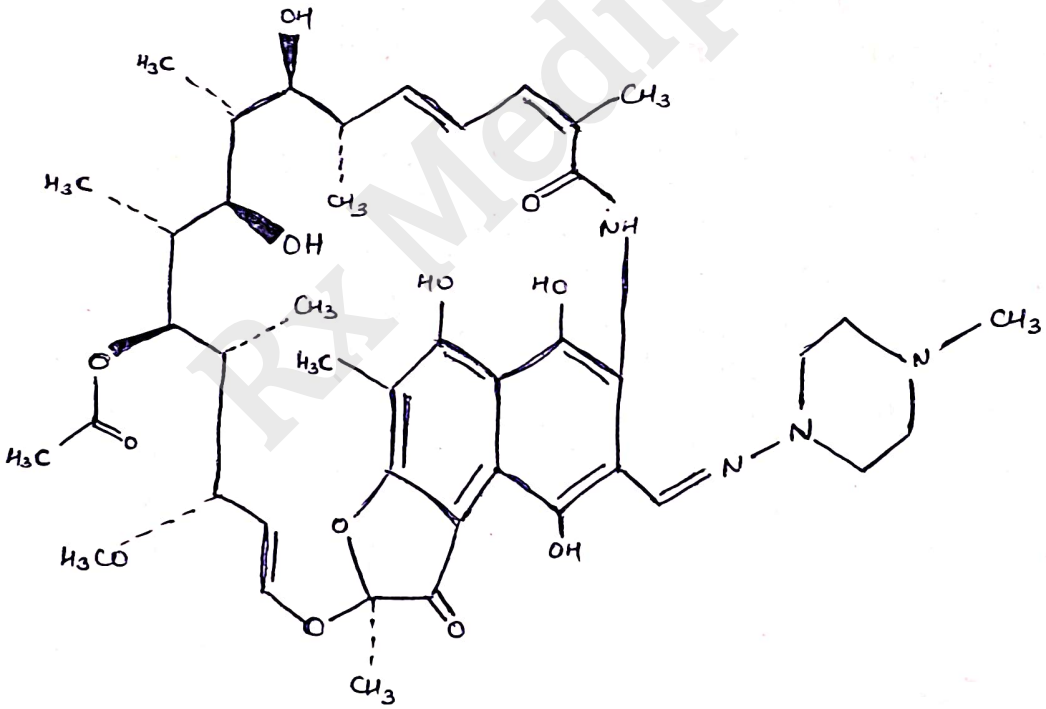


→ Pyrazinamide



Anti - Tubercular Antibiotics

→ Rifampicin



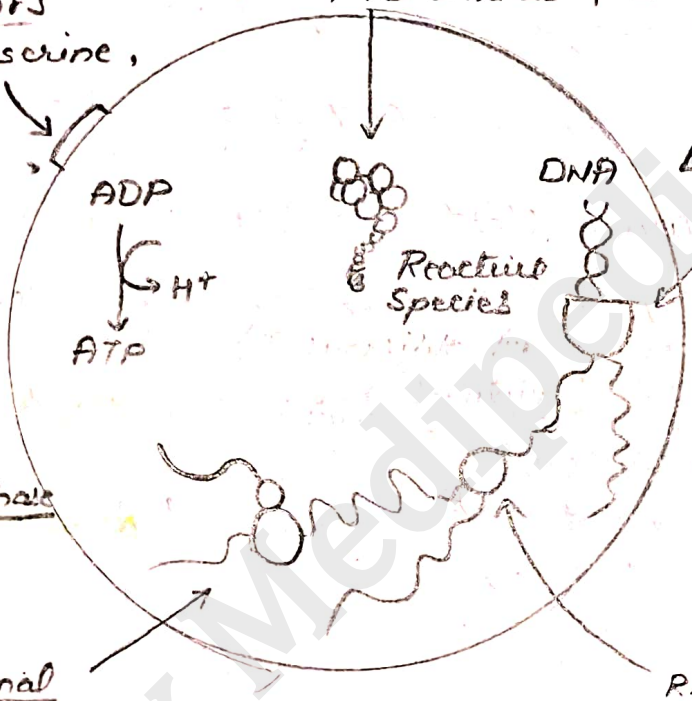
Mode of Action

Cell Wall Synthesis Inhibitors

Isoniazid, Cycloserine, Ethambutol, ET, Prothionamide

Reactive Species

Pretomanid, Delomanid



DNA Gyrase Inhibitors

Levofloxacin, Moxifloxacin

bacterial Cell (Mycobacterium tuberculosis)

Inhibit ATP Synthase

Bedaquiline

Affect Ribosomal Activity

Streptomycin, Kanamycin, Amikacin, Linezolid

RNA Polymerase Inhibitor

Rifampin, Rifabutin, Rifapentin

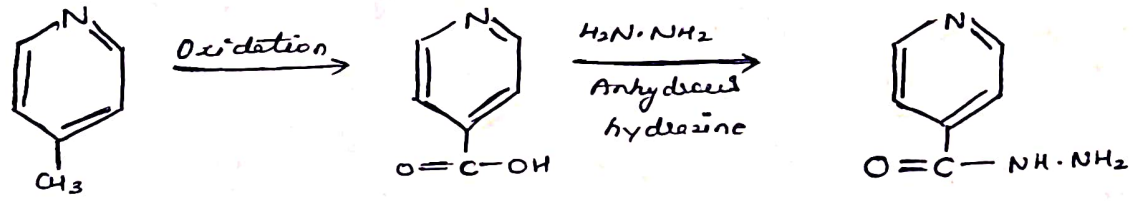
Reactive Species → Responsible for multiplication

Cell wall → provide structure and protection to bacteria

DNA → for transcription and Translation

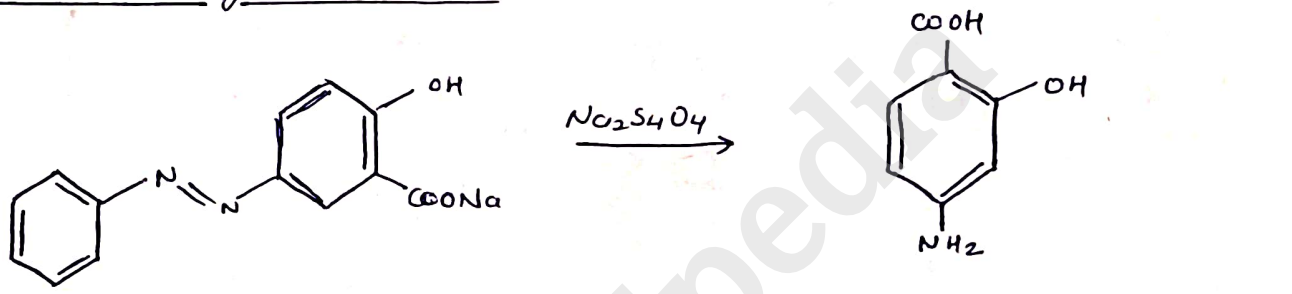
SYNTHESIS

1. Isoniazid



4-Methyl Pyridine — Isonicotinic Acid — Isoniazid

2. Paraminosalicylic Acid



Sodium Salt of 5-(phenylazo) salicylic Acid — Paraminosalicylic Acid

URINARY TRACT ANTI - INFECTIVE AGENTS

→ Urinary Tract infections : UTI is an infection that affects part of the urinary tract.

→ The urinary tract is made up of kidneys, ureters, bladder, and urethra.

→ UTI are caused by bacteria, but some are caused by fungi and rare cases by Viruses.

→ UTI are more common in women than men (8:1)

SYMPTOMS OF URINARY TRACT INFECTION :

→ Burning Sensation and pain with urination

→ Increased frequency of urination without passing much urine

→ Increased urgency of urination

→ Bloody urine or Cloudy urine

→ Urine that has strong odour

→ Pelvic pain in women

→ Rectal pain in men

ANTI INFECTIVE AGENTS FOR URINARY TRACT INFECTIONS

These are the synthetic anti-bacterial Agents include sulfonamides, nitrofurans and the quinolones.

These are used to treat local and systemic urinary tract infections.

CLASSIFICATION OF URINARY TRACT ANTI-INFECTIVE AGENTS

a) **Quinolones**

Norfloxacin, Ciprofloxacin, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin

b) **Napthyridines**

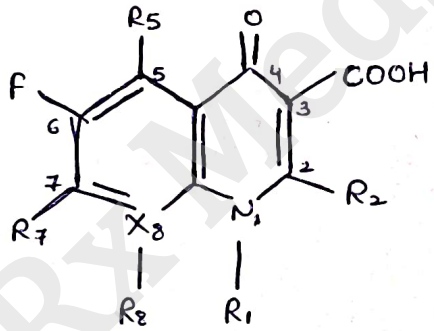
Nalidixic Acid, Enoxacin

c) **Miscellaneous**

furazolidine, Nitrofurantoin, Methanamine

QUINOLONES

Quinolones are really not anti-biotics but a chemotherapeutic antimicrobial agents, have active against organisms.



MECHANISM OF ACTION

Quinolones performs anti bacterial effect.

↓

Inhibition of ligase activity (Binding Activity) of Topoisomerases (Type II) gyrase and Topoisomerase IV

↓

Prevent DNA Duplication

↓

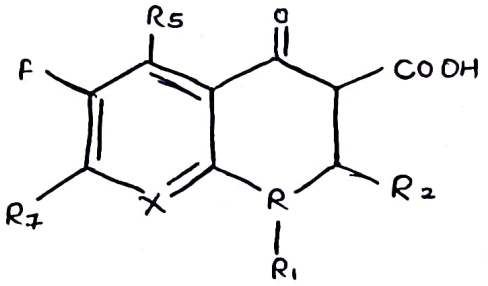
DNA single and double strands break

↓

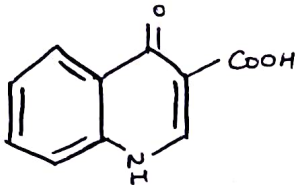
Cell Death

→ First & Second generation fluroquinolones Selectively inhibit Topoisomerase - II, Ligase leads DNA breakdown.

STRUCTURE ACTIVITY RELATIONSHIP



→ 1,4 dihydro - 4 - oxo - 3 pyridine carboxylic Acid moiety is essential for Activity.



→ Pyridine system must be attached with aromatic ring

→ Introduction of substituents at position 2 reduces the Activity.

→ Substituents at position 5, 6, 7 and 8 of annulated ring results in better active compounds.

→ Piperazinyl substitutions at 7 enhances activity.

→ F atom substitution at position 6 enhanced anti - bacterial Activity.

→ Alkyl substitution at 1 - position is essential for Activity.

→ Aryl substitution at 1 position with Anti - bacterial Activity.

CLASSIFICATION OF QUINOLONES

1. First - Generation

ex. Flumequine (Veterinary Use), Oxolinic Acid, Rosoxacin [Quinolones]

Non- Quinolones - Cinoxacin, Nalidixic Acid, Piromidic Acid, pipemidic Acid

2. Second Generation

Quinolones: Ciprofloxacin, Fleroxacin, Lomefloxacin, Nadifloxacin, Norfloxacin, Ofloxacin, Pefloxacin, Rufloxacin

Non- Quinolones: Enoxacin

3. Third - Generation

Quinolones- Balofloxacin, Grepafloxacin, Levofloxacin, Pazufloxacin, Sparfloxacin, Temafloxacin

Non- Quinolones- Tosufloxacin

4. fourth Generation

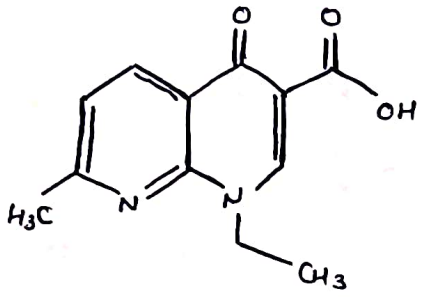
ex. Clinafloxacin, Gatifloxacin, Moxifloxacin, Sitafloxacin, Prulifloxacin, Besilfloxacin, Delafloxacin

5. Veterinary used Quinolones

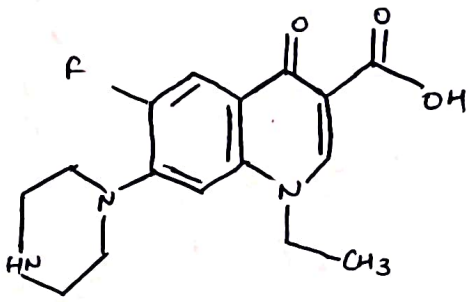
ex. Danofloxacin, Difloxacin, Enrofloxacin, Ibafloxacin, Marbafloxacin, Orbifloxacin, Sarafloxacin

DRUG PROFILE

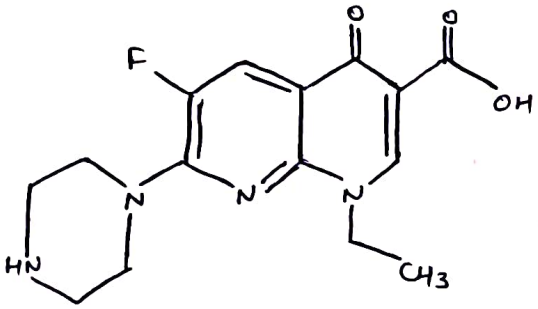
→ Nalidixic Acid



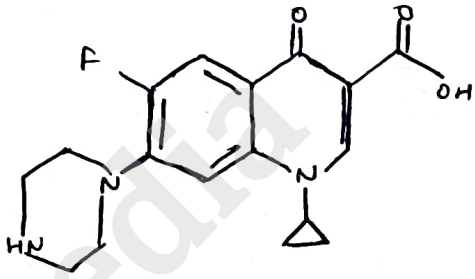
→ Norfloxacin



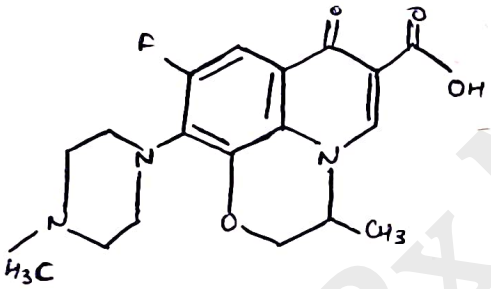
→ Enoxacin



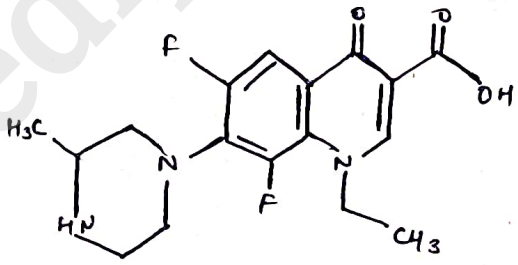
→ Ciprofloxacin



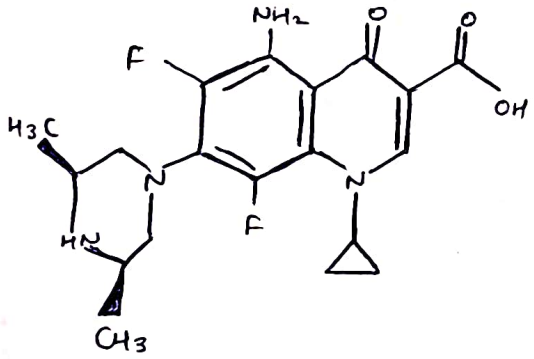
→ Ofloxacin



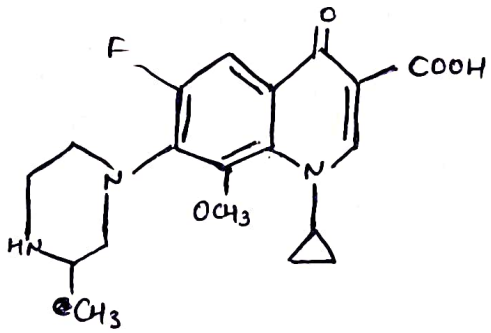
→ Lomefloxacin



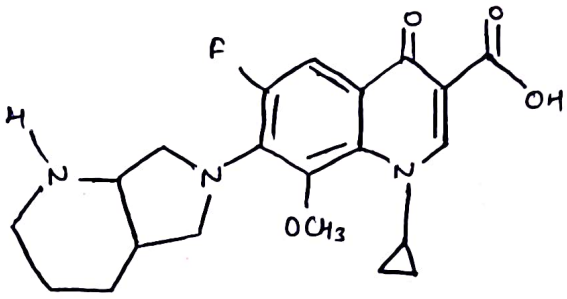
→ Sparfloxacin



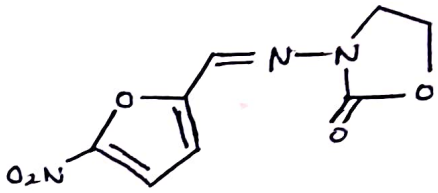
→ Gatifloxacin



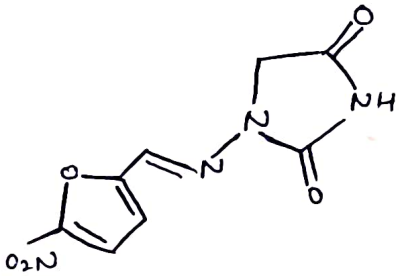
→ Moxifloxacin



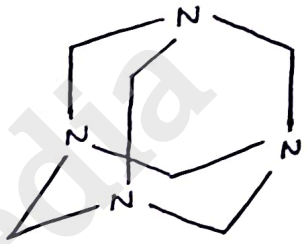
→ furazolidine



→ Nitrofurantoin



→ Methenamine



ANTI-VIRAL AGENTS

VIRUS

- Only DNA or RRA present
- Need a host Cell to multiply

→ Viruses are the obligate parasites containing one type of Nucleic Acid, a genetic material which is either RNA or DNA.

→ It requires specific Cells or host cells for multiplication and is depend largely on host cell biochemistry for nutrition and Reproduction.

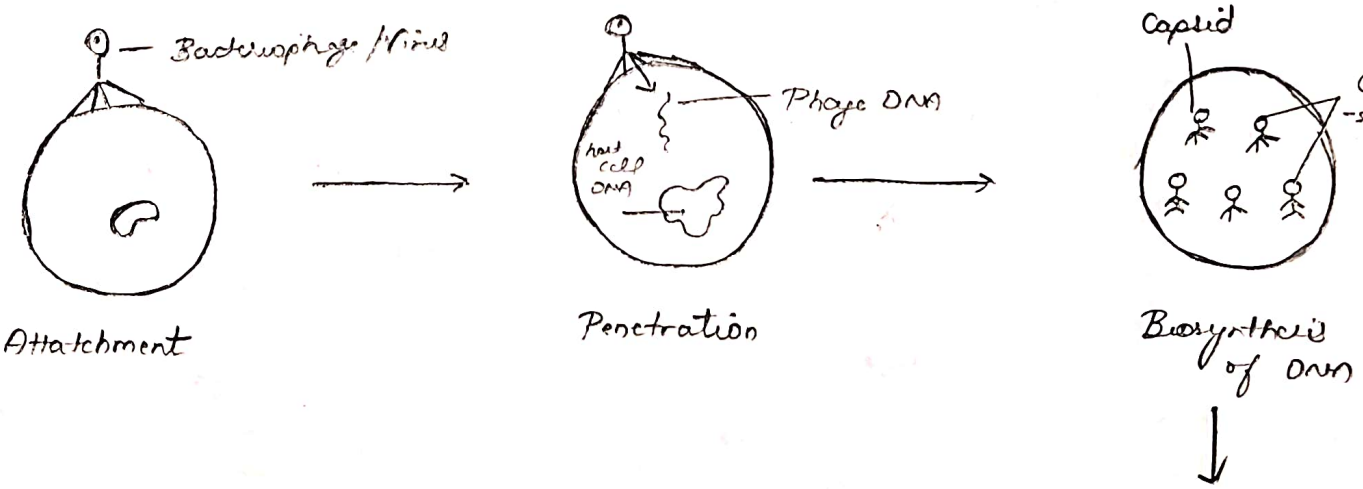
→ Virus produce many diseases like dengue, polio, rabis, chicken pox, small pox etc.

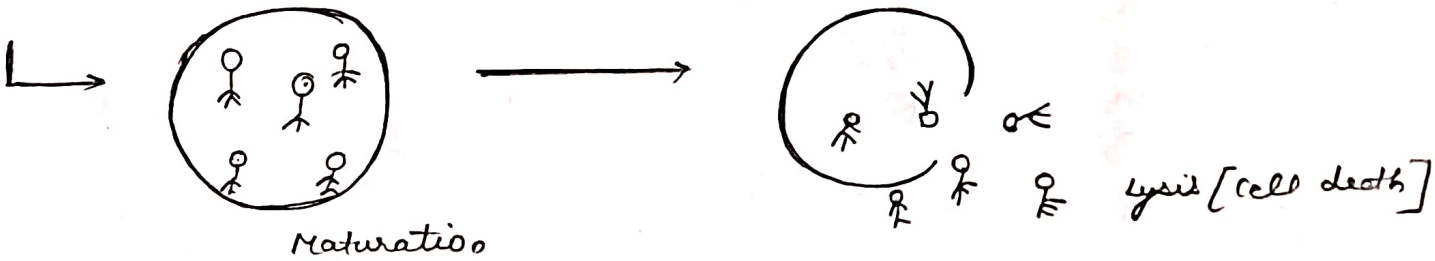
Types of Virus

i) Virus Containing DNA
   eg. Adinovirus & Pox Virus

ii) Virus containing RNA
   eg. Myxovirus and Arbovirus

VIRUS REPLICATION





1. Attachment : The phage attaches to the membrane of host Cell.

↓

2. Penetration : The Viral DNA enters into the host Cell by penetrating the Cell membrane.

↓

3. Biosynthesis : At this phase, Phase DNA or Viral DNA Replicates ~~of~~ & proteins are made.

↓

4. Maturation : New Viral particles assembled and Replicates.

↓

5. Lysis : At this point, the breakdown of host plasma membrane occurs and new viruses after distroying the Cell, leave it and invade fresh Cells.

DISEASES CAUSED BY VIRUS

1. Herpes simplex viruses - Eye infections, skin diseases and genital infections.
2. Influenza Virus - Influenza A, B and C
3. Rabies Virus - Rabies
4. Polio Virus - Poliomyelitis
5. Parainfluenza Virus - Parainfluenza
6. Variola Virus - Small pox
7. Vaccinia Virus - Cowpox
8. Varicella - zoster Virus - Chickenpox and Herpes zoster
9. Rhino Viruses - Respiratory diseases, Common Cold.

Anti-Viral drugs

These are a class of drugs which are used for the treatment of Viral infections. These drugs prevent virus replication by inhibiting Viral DNA Polymerase, inhibit Viral Penitration, inhibit Viral Protein synthesis & Block last stages of Virus assembly.

CLASSIFICATION

1. Anti-Influenza Viral Drugs:

ex. Amantadine, Rimantadine, Oseltamivir, Zanamivir

2. Anti - herpes Viral drugs

ex. Idoxuridine , Acyclovir , Valacyclovir , famcyclovir , Goncyclovir , foscarnet

3. Anti - Retro Viral Drugs

a) Nucleoside Reverse transcriptase inhibtors (NRTIs)

ex. Zidovudine , Didanosine , Zalcitabine , Stavudine , Lamivudine, Abacavir , Tenofovir

b) Non - Nucleoside reverse transcriptase inhibtors (NNRTI's)

ex. Nevirapine , Efavirenz , Loviride , Delorirdine

c) Protease Inhibtors

ex. Amprenavir , Lopinavir

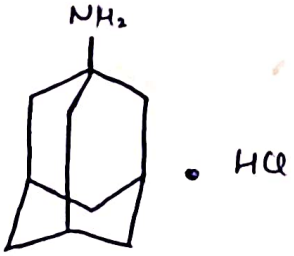
4. Non - Selective Anti - Viral Drugs

ex. Ribavirin , Adeforirdipiroxil , interferon-a.

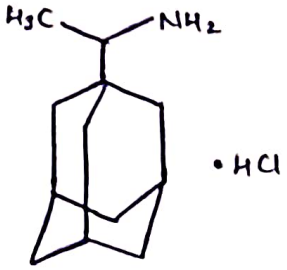
DRUG PROFILE

1. Anti - Influenza Viral drugs

→ Amantadine Hydrochloride

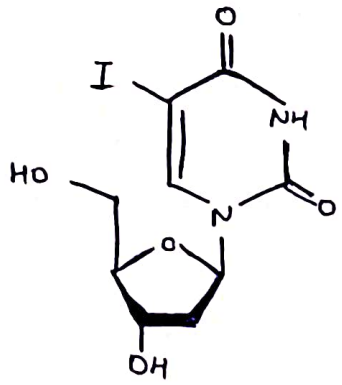


→ Rimantadine • HCl

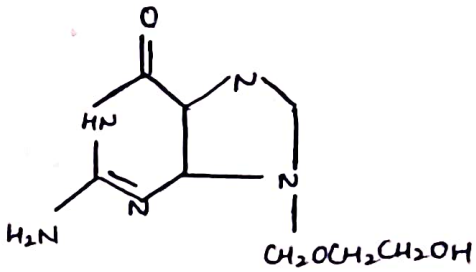


2. Anti - Herpes Viral drugs

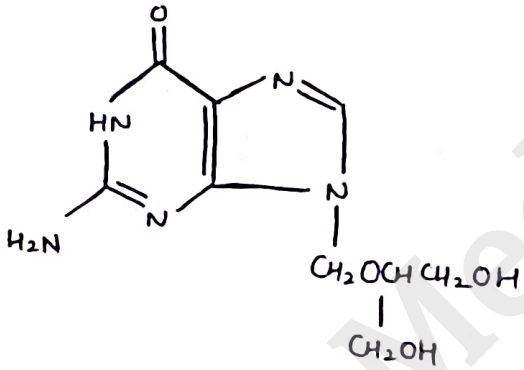
→ Idoxuridine



→ Acyclovir

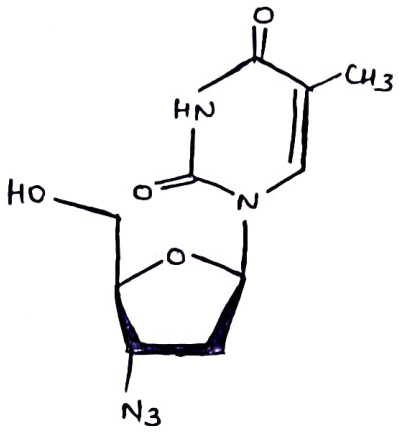


→ Ganacyclovir

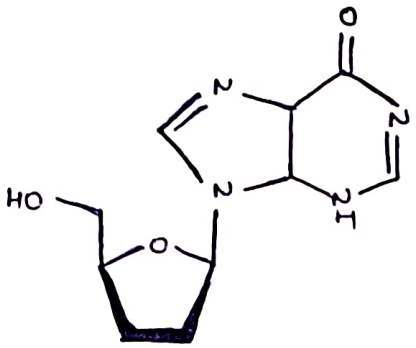


3. Anti - Retro Viral Drugs

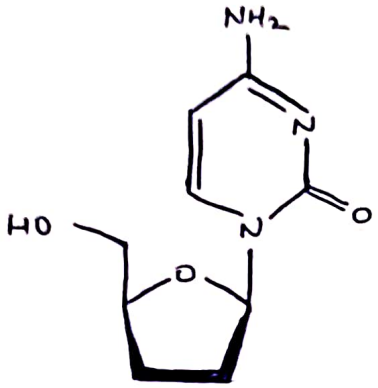
→ Zidovudine



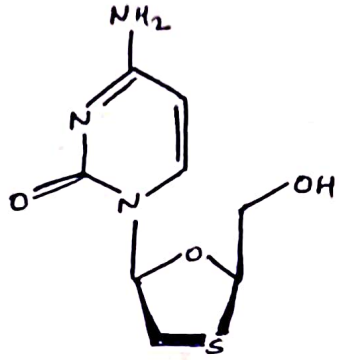
→ Didanosine



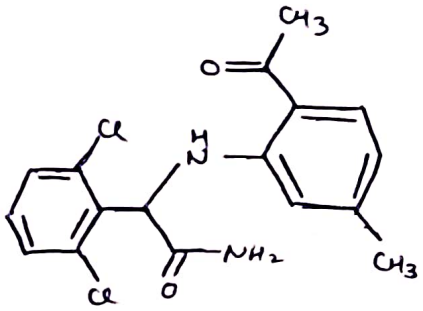
→ Zalcitabine



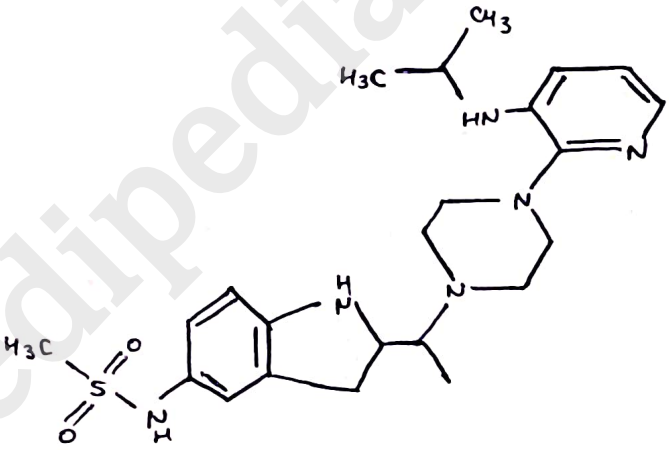
→ Lamivudine



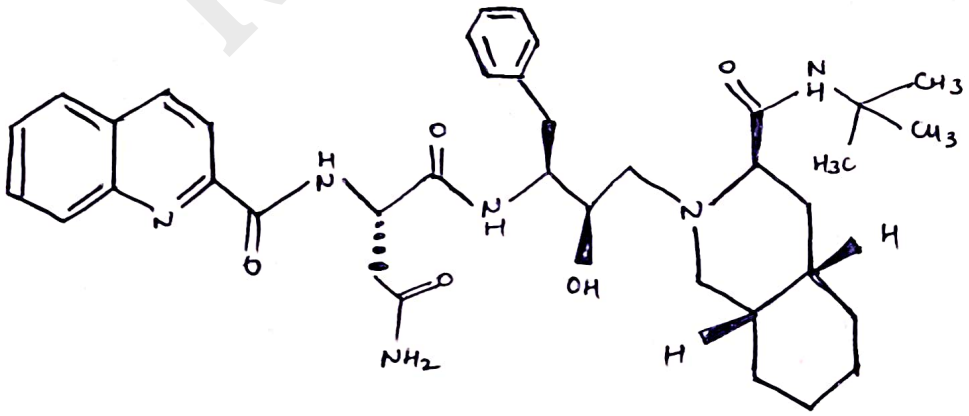
→ Loviride



→ Delavirdine

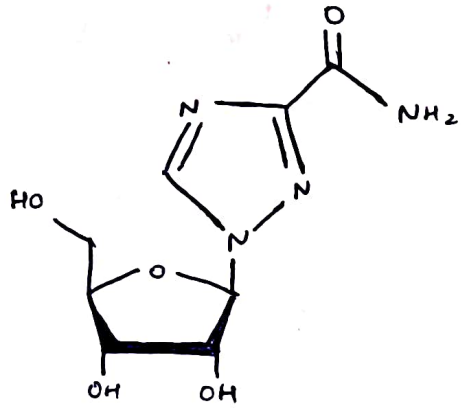


→ Saquinavir



4. Non Selective Anti-Viral Drugs

→ Ribavirin



SYNTHESIS

→ Acyclovir