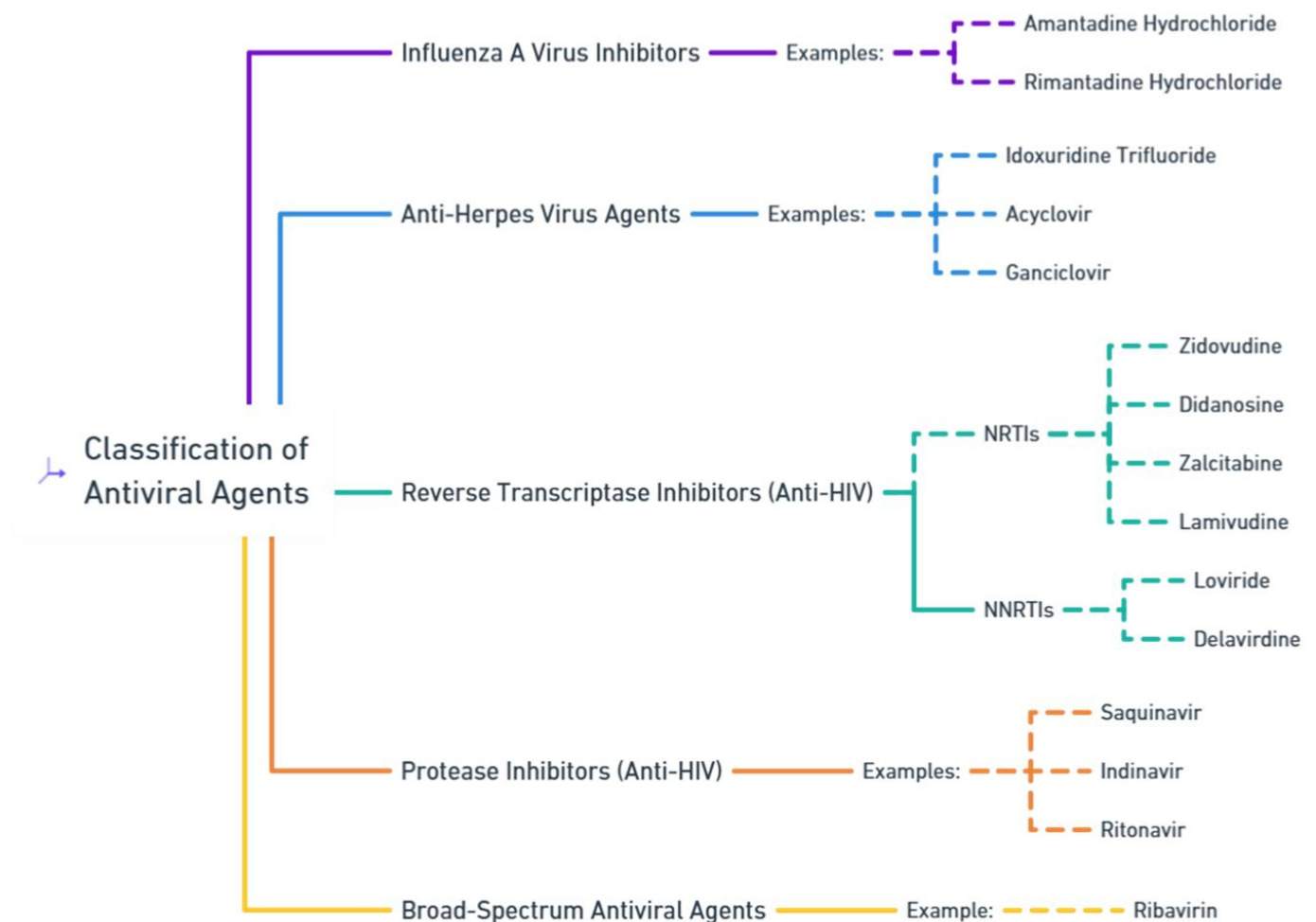


Antiviral Agents

Antiviral Agents

- Antiviral agents are medications used to treat viral infections.
- They act by:
 - Inhibiting viral replication, or
 - Modulating the host's immune response.
- These agents can be classified based on:
 - The target virus, or
 - Their mechanism of action.

Classification of Antiviral Agents



1. Influenza A Virus Inhibitors

- These agents inhibit viral replication by **blocking the M2 protein**, an ion channel essential for the viral lifecycle.
- They are effective primarily against **influenza A viruses**.

Examples:

- **Amantadine Hydrochloride**
- **Rimantadine Hydrochloride**

2. Anti-Herpes Virus Agents

- These agents work by **inhibiting viral DNA synthesis** in herpes viruses.

Examples:

- **Idoxuridine Trifluoride** (*used topically for herpetic keratitis*)
- **Acyclovir**
- **Ganciclovir**

Mechanism of Action:

- **Idoxuridine** is incorporated into viral DNA, disrupting replication.
- Acyclovir & Ganciclovir are nucleoside analogs that, once phosphorylated, act as competitive inhibitors of viral DNA polymerase and function as chain terminators.

3. Reverse Transcriptase Inhibitors (Anti-HIV Agents)

- These drugs inhibit the reverse transcriptase enzyme, which is critical in the lifecycle of retroviruses like HIV.

Examples:

- **Nucleoside Reverse Transcriptase Inhibitors (NRTIs):**
 - Zidovudine
 - Didanosine
 - Zalcitabine
 - Lamivudine
(*Incorporated into viral DNA, causing chain termination.*)
- **Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs):**
 - Loviride
 - Delavirdine
(*Bind to reverse transcriptase, inducing conformational changes that inhibit activity.*)

4. Protease Inhibitors (Anti-HIV Agents)

- These agents inhibit **HIV protease**, preventing the cleavage of viral **polyproteins** into functional proteins, which is essential for viral maturation.

Examples:

- **Saquinavir**
- **Indinavir**
- **Ritonavir**

5. Broad-Spectrum Antiviral Agents

- These agents exhibit antiviral activity against a wide range of **RNA and DNA viruses**.

Example:

- **Ribavirin** (Believed to inhibit viral RNA synthesis and modulate the host's immune response.)

Brand Names Of Important Marketed Products

Used to treat viral infections including HIV/AIDS.

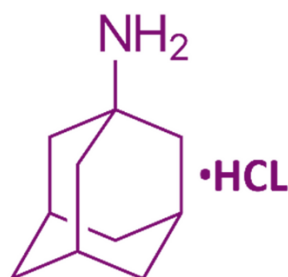
Drug Name	Brand Name(s)	Formulation	Use
Acyclovir	Zovirax, Acivir	Tablet, Cream	Herpes simplex, zoster
Valacyclovir	Valtrex, Valcivir	Tablet	Herpes, zoster
Oseltamivir	Tamiflu	Capsule	Influenza A & B
Lamivudine	Epivir, Lamivir	Tablet	HIV, HBV
Zidovudine (AZT)	Retrovir, Zidovir	Tablet, Injection	HIV
Tenofovir	Viread, Tenvir	Tablet	HIV, HBV
Efavirenz	Sustiva, Efavir	Tablet	HIV
Dolutegravir	Tivicay, Instgra	Tablet	HIV (INSTI)
Combination ART	Trioday, Duovir, Acriptega	Tablet	Anti-HIV fixed combinations

Various Antiviral Agents (Drugs)

1. Amantadine Hydrochloride

Chemical Structure / Formula

- **Formula:** C₁₀H₁₇N · HCl
- **Structure:** Tricyclic amine (adamantane derivative) with a **primary amine (-NH₂)** group.



Mechanism of Action

- Inhibits M2 proton channel of Influenza A virus, preventing viral uncoating and entry into host cells.
- Also increases dopamine release, which is why it is used in Parkinson's disease.

Uses

- **Prevention and treatment of Influenza A** (not effective against Influenza B).
- **Parkinson's disease** (as a dopamine agonist).

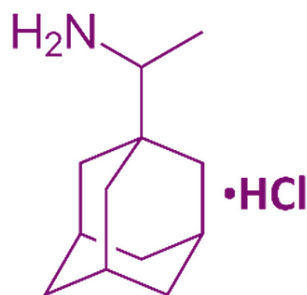
Side Effects

- CNS toxicity (dizziness, confusion, hallucinations).
- GI disturbances (nausea, vomiting, dry mouth).
- Livedo reticularis (mottled skin discoloration).

2. Rimantadine Hydrochloride

Chemical Structure / Formula

- **Formula:** $C_{12}H_{21}N \cdot HCl$
- **Structure:** Adamantane derivative with a **methyl-substituted amine** (more lipophilic than amantadine).



Mechanism of Action

- Inhibits M2 ion channel of Influenza A, preventing viral uncoating.
- More potent and has fewer CNS side effects than amantadine.

Uses

- Influenza A prevention and treatment.

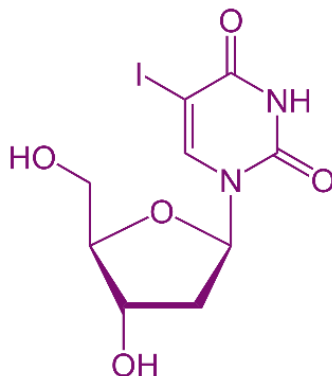
Side Effects

- Less CNS toxicity than amantadine.
- GI upset, nausea, insomnia.

3. Idoxuridine Trifluoride

Chemical Structure / Formula

- **Formula:** C₉H₁₁N₂O₅
- **Structure:** A pyrimidine nucleoside analog with an iodine at position 5.



Mechanism of Action

- Incorporates into viral DNA, leading to strand breaks and faulty replication.

Uses

- Herpes simplex keratitis (HSV eye infections, topical use only).

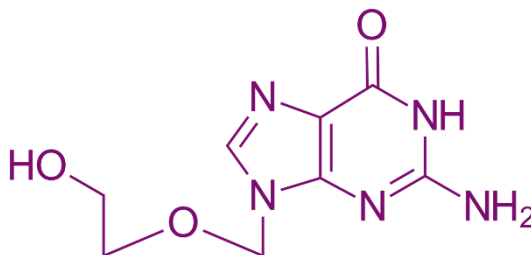
Side Effects

- Corneal irritation, photophobia, burning sensation.

4. Acyclovir*

Chemical Structure / Formula

- **Formula:** C₈H₁₁N₅O₃
- **Structure:** A purine nucleoside analog (acyclic guanosine derivative).



Mechanism of Action

- Prodrug activated by viral thymidine kinase (TK) to acyclovir monophosphate.
- Further phosphorylated to acyclovir triphosphate, which inhibits viral DNA polymerase and causes chain termination.



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