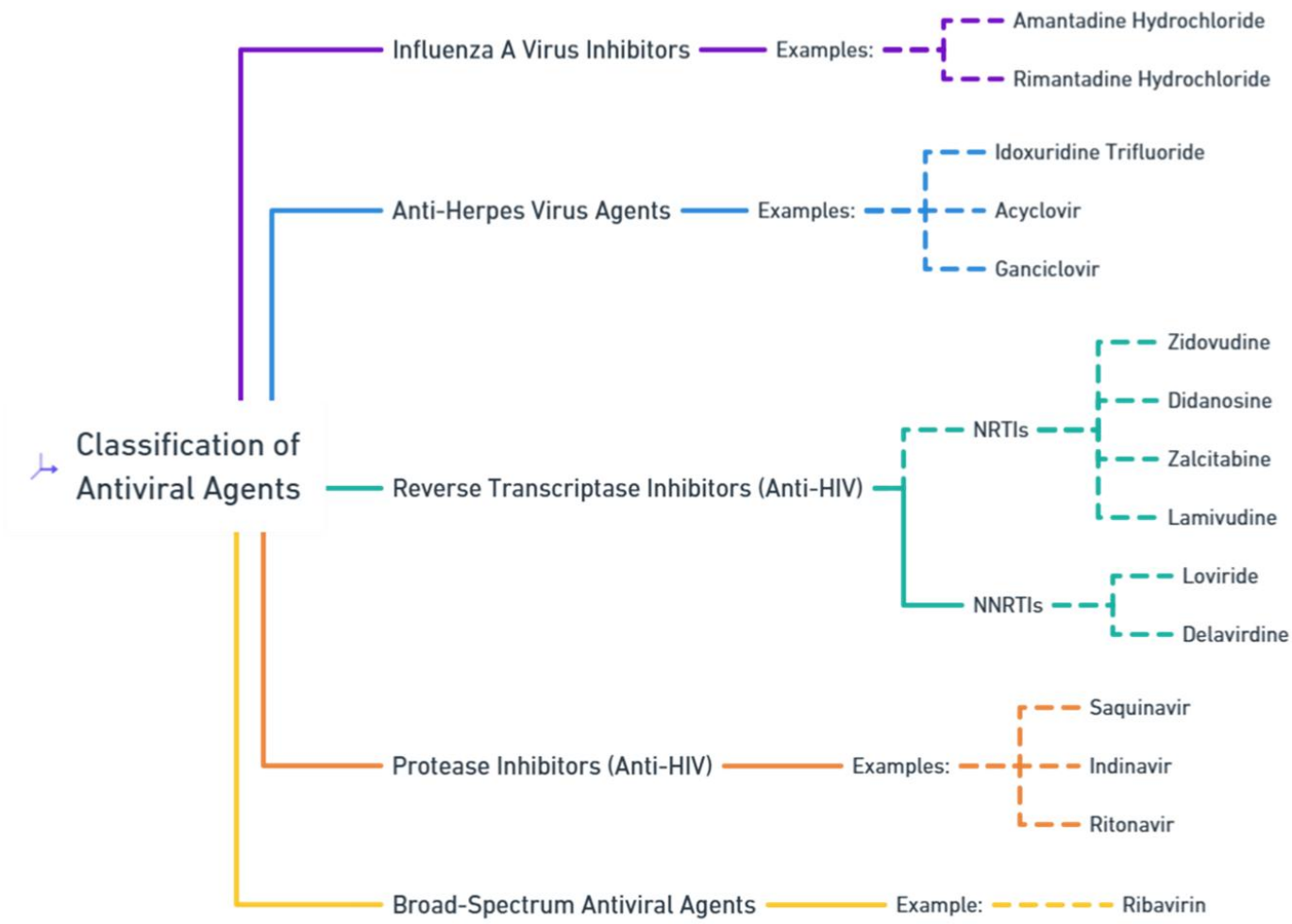
Antiviral Agents

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.

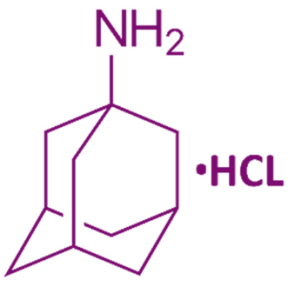
Drug Name	Brand Name(s)	Formulation	Use
Acyclovir	**Zovirax, Acivir**	Tablet, Cream	Herpes simplex, zoster
Valacyclovir	**Valtrex, Valcivir**	Tablet	Herpes, zoster
Oseltamivir	**Tamiflu**	Capsule	Influenza A & B
Lamivudine	**Epivir, Lamivir**	Tablet	HIV, HBV
Zidovudine (AZT)	**Retrovir, Zidovir**	Tablet, 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).

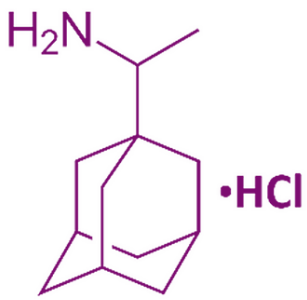
Side Effects

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

2. Rimantadine Hydrochloride

Chemical Structure / Formula

- **Formula:** C12H21N · 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.

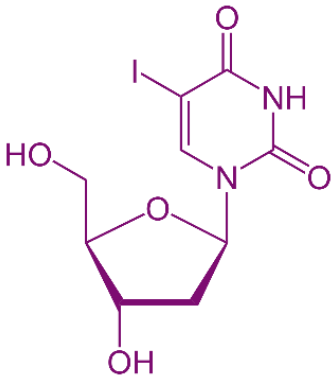
Side Effects

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

3. Idoxuridine Trifluoride

Chemical Structure / Formula

- **Formula:** C9H11IN2O5
- **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).

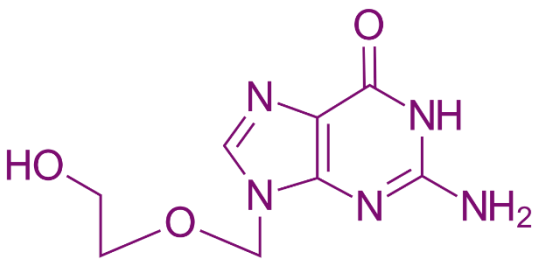
Side Effects

- 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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