

## 12. Viral hepatitis

Viruses also cause hepatitis (jaundice). **Hepatitis** viruses have **5 types –A to E**. Hepatitis A, C,D and E are **ssRNA** viruses but **hepatitis B is a DNA** viruse. **Hepatitis A** spreads via **faecal-oral** rout or via **contaminated food and water**. **Hepatitis B is highly infectious. Causes Hepatocellular carcinoma. Hepatitis B virus used to be a major cause of post-transfusion hepatitis. Hepatitis B is also transmitted by drug abusers and sexually. Hepatitis B is a DNA virus. Electron microscope shows a circular particle called Danes particle. Hepatitis B surface Antigen (HBsAg) is found on danes particle. Hepatitis B infection can be diagnosed by HBsAg ELISA.**

**Hepatitis C is milder infection than Hepatitis B. Hepatitis D is also known as delta agent\***

**Hepatitis E spreads mostly due to contaminated water\***

	Hepatitis A	Hepatitis B	Hepatitis C	Hepatitis D	Hepatitis E
Synonym	Infectious hepatitis	Serum hepatitis	Hepatitis C	Delta hepatitis	Hepatitis E
Type of virus	ssRNA	dsDNA	ssRNA	ssRNA	ssRNA
Incubation period	2–7 weeks	1–6 months	2–26 weeks	2–12 weeks	6–8 weeks
Transmission	Faecal–oral	Predominantly parenteral	Parenteral	Parenteral	Faecal–oral
Carrier state	No	Yes	Yes	Yes	No
Severity of hepatitis	±	++	+	+	±
Immunity					
Passive immunization	Hyperimmune globulin	Hyperimmune globulin	None	Hyperimmune globulin	None
Active immunization	Vaccine (hepatitis A)	Vaccine (hepatitis B)	None	Vaccine (hepatitis B)	None

ss, single-stranded; ds, double-stranded.

## 13. Antiviral therapy

Antibiotics are used to control bacterial/fungal infections only. Antibiotics do not act on viruses. Antiviral agents can treat viral infections. Zidovudine is an antiviral used against AIDS.

### Key characteristics of antiviral drugs

- Able to enter the cells infected with virus
- Interfere with viral nucleic acid synthesis and/or regulation
- Some drugs interfere with ability of virus to bind to cells
- Some drugs stimulate the body's immune system
- Best responses to antiviral drugs are in patients with competent immune systems
- A healthy immune system works synergistically with the drug to eliminate or suppress viral activity

### How Antiviral drugs work:

- Prevention of Viral Entry
- Targeting the RNA/DNA replication in the cell
- Targeting the transcriptase factors for Viral DNA
- Destroying Viral proteases so that viral proteins are not cut and rearranged in optimal order
- Stopping the release of the mature viruses from the host cell

### Examples of Antiviral drugs:

#### 1. Aciclovir-

- A widely used antiviral with main implications in the treatment of herpes
- Seen as a “new age” in antiviral therapy, Gertrude Elion, its creator, was given the Nobel prize for medicine in 1988
- It is a nucleoside analogue and prevents viral replication in infected cells

#### 2. Tamiflu-\*

- Recently sold to 40 countries to battle Avian flu\*
- Prevents the mature viruses from leaving the cell

- **It is a neuraminidase inhibitor, it works on both influenza A and B**
- Neuraminidase is an enzyme found on the virus which cleaves sialic acid from cell membrane, leading to a more effective release of viruses.
  
- **Reverse transcriptase inhibitors (RTIs)**
  - **Block activity of the enzyme reverse transcriptase, preventing production of new viral DNA**
- **Reverse transcriptase inhibitors (RTIs)**
  - **Nucleoside RTIs (NRTIs)**
  - **Nonnucleoside RTIs (NNRTIs)**
  - **Nucleotide RTIs (NTRTIs)**
- **Examples**

<b>abacavir (Ziagen)</b>	<b>delavirdine (Rescriptor)</b>
<b>didanosine (Videx)</b>	<b>lamivudine (Epivir)</b>
<b>stavudine (Zerit)</b>	<b>tenofovir (Viread)</b>

**Protease inhibitors (PIs)**

**Inhibit the protease retroviral enzyme, preventing viral replication**

**Fusion inhibitors**

**Inhibit viral fusion, preventing viral replication**

**Newest class of antiretroviral drugs**

**Example: enfuvirtide (Fuzeon)**

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## 14. Warts

Benign tumors of the skin are called Warts. Warts can be caused by Human Papillomaviruses.



### HUMAN PAPILLOMAVIRUS (HPV)

- Papovavirus
- Most common viral STD
- ds DNA virus of 7.9 kB
- Entire DNA sequence is known

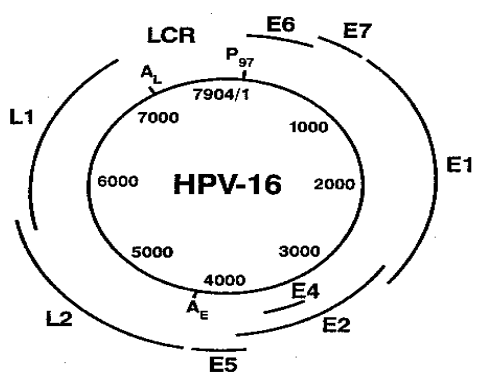
### METHODS TO DETECT HPV INFECTION

Clinical diagnosis: Genital warts. Epithelial defects. See cellular changes caused by the virus:

Pap smear screening

Directly detect the virus: DNA hybridization or PCR\*

Detect previous infection: (Research Only) Detection of antibody against HPV\*



## 1. Retroviruses

Human Immuno-Deficiency Virus (HIV) is a retrovirus. HIV causes Acquired Immuno-Deficiency Syndrome (AIDS). Retrovirus genome has 3 main genes: *gag* gene, *pol* gene and *env* gene.

*Gag* gene codes for core protein antigens.

*Pol* gene codes for protein reverse transcriptase.

*Env* gene codes for envelope glycoproteins.

Route of transmission: sexual, blood and blood products, Intravenous drugs and mother to child. HIV does not spread by shaking hands, hugging, eating in a same plate, etc.

HIV virus is cytopathic to CD4 T helper cells.

AIDS correlates with a decrease in the CD4 lymphocytes and P24 antigen in blood.

