

**Five (5) viruses:**

- A. Hepatitis A virus (HAV)
- B. Hepatitis B virus (HBV)
- C. Hepatitis C virus (HCV)
- D. Hepatitis D virus (HDV): Defective virus and can cause infection only if HBV is present. It is also called the delta agent.
- E. Hepatitis E virus (HEV)

All these viruses infect the hepatocytes causing liver inflammation (hepatitis).

**Structure of hepatitis viruses:**

- A. Hepatitis A virus (HAV): positive-sense single stranded RNA non-enveloped
- B. Hepatitis B virus (HBV): double stranded DNA enveloped
- C. Hepatitis C virus (HCV): positive-sense single stranded RNA enveloped
- D. Hepatitis D virus (HDV): negative-sense single stranded RNA enveloped
- E. Hepatitis E virus (HEV): positive-sense single stranded RNA non-enveloped

Based on structure, transmission of hepatitis viruses occurs mainly through:

- A. Hepatitis A virus (HAV): fecal-oral route (water or food contaminated by fecal material)
- B. Hepatitis B virus (HBV): blood (transfusion, injection drug use, needlestick injuries), mother-to-child, sexual, organ transplant patients, hemodialysis patients.

- C. Hepatitis C virus (HCV): blood (transfusion, injection drug use, needlestick injuries), organ transplant patients, hemodialysis patients. Mother-to-child, and sexual can occur but less compared to HBV.
- D. Hepatitis D virus (HDV): same as HBV except for sexual transmission.
- E. Hepatitis E virus (HEV): fecal-oral route (water or food contaminated by fecal material).

### **Clinical features:**

- The incubation period is few weeks for HAV and HEV.
- The incubation period is few months for HBV, HCV and HDV.
- All 5 viruses cause acute hepatitis: Jaundice (يرقان، صفار), nausea, vomiting, anorexia (فقدان في الشهية), and fever with high levels of liver enzymes (ALT and AST).
- Asymptomatic acute infection can occur.
- All 5 viruses can cause fulminant hepatitis (acute liver failure) in a minority of patients (less than 1% on average).
- HBV, HCV and HDV cause chronic infection (continue to be present in the body for more than 6 months). Chronic infection progress to cirrhosis (تشمع الكبد) and subsequently to hepatocellular carcinoma. So, HBV and HCV can be considered as **oncoviruses**.

### **Diagnosis:**

- A. Hepatitis A virus (HAV): Serology. HAV IgM (acute infection). HAV IgG (past infection or vaccination).
- B. Hepatitis B virus (HBV): Serology, molecular detection.
- C. Hepatitis C virus (HCV): Serology, molecular detection.
- D. Hepatitis D virus (HDV): First, HBV must be present. Serology, molecular detection.

E. Hepatitis E virus (HEV): Serology. HEV IgM (acute infection).

**Treatment:**

- Acute infection: Supportive care
- Chronic HBV: Antiviral medications (nucleoside analogs), interferon.
- Chronic HCV: Antiviral medications (direct-acting antivirals DAAs), interferon.
- Chronic HDV: Interferon. HBV control. Newer drugs are evaluated.

**Prevention:**

- HAV: Inactivated vaccine (very effective). Two doses
- HBV: Subunit vaccine. Three doses. HBV vaccination prevents HDV infection.

**Epidemiology**

“WHO estimates that 296 million people were living with chronic hepatitis B infection in 2019, with 1.5 million new infections each year.”

“Globally, an estimated 58 million people have chronic hepatitis C virus infection, with about 1.5 million new infections occurring per year.”

Sources:

[https://www.who.int/news-room/fact-sheets/detail/hepatitis-c;](https://www.who.int/news-room/fact-sheets/detail/hepatitis-c)

[https://www.who.int/news-room/fact-sheets/detail/hepatitis-b;](https://www.who.int/news-room/fact-sheets/detail/hepatitis-b)