Viral hepatitis

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Introduction

- **Acute Hepatitis**: Short-term hepatitis.

  Body's immune system clears the virus from the body within 6 months

- **Chronic Hepatitis:** Long-term hepatitis.

  nfection lasts longer than 6 months because the body's immune system cannot clear the virus from the body

- **Fulminant:** Developing quickly and lasting a short time, high mortality rate.

Introduction

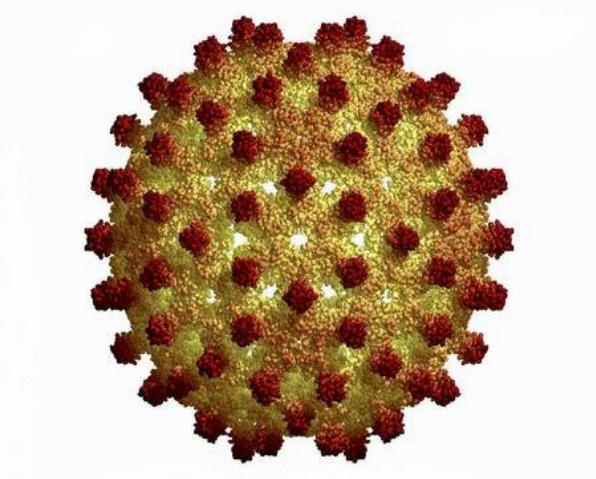
- The term viral hepatitis is used to describe infection of the liver caused by hepatotropic viruses
- Currently there are 5 varieties of these viruses and a sixth poorly characterized virus, causing distinct types of viral hepatitis.
- Hepatitis A virus: causes faecally spread self limiting disease.
- Hepatitis B virus: causes parenterally transmitted disease that may be chronic
- Hepatitis C virus: transfusion related hepatitis
- Hepatitis delta virus: it is sometimes associated as superinfection with hepatitis B

Introduction..

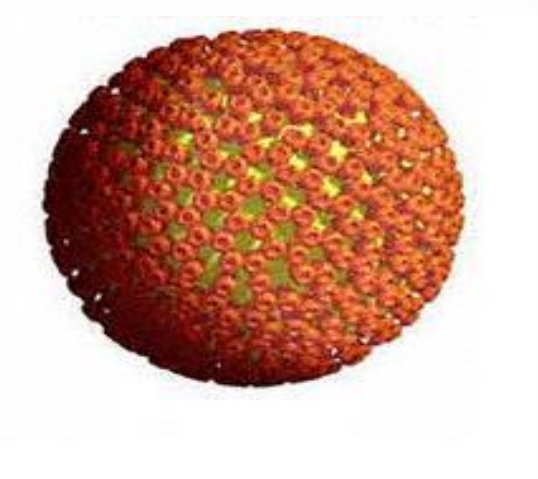
- Hepatitis E virus: water born infection
- Hepatitis G virus: recently discovered parenterally transmitted hepatotropic virus
- All these human hepatitis viruses are RNA viruses except HBV which is a DNA virus.
- Acute hepatitis may be associated with all five types of hepatitis and rarely exceeds 6 months in duration.

Viral Hepatitis

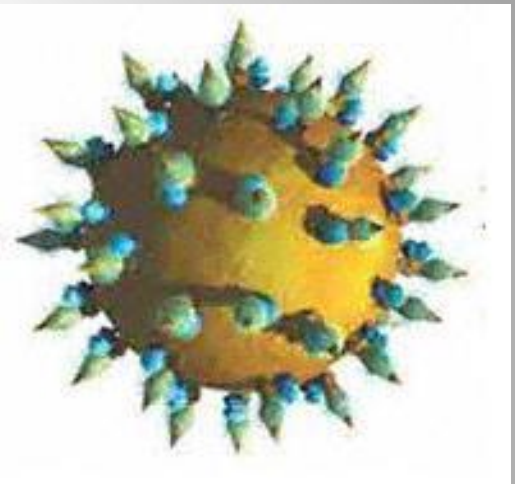
Hepatitis caused by viruses:



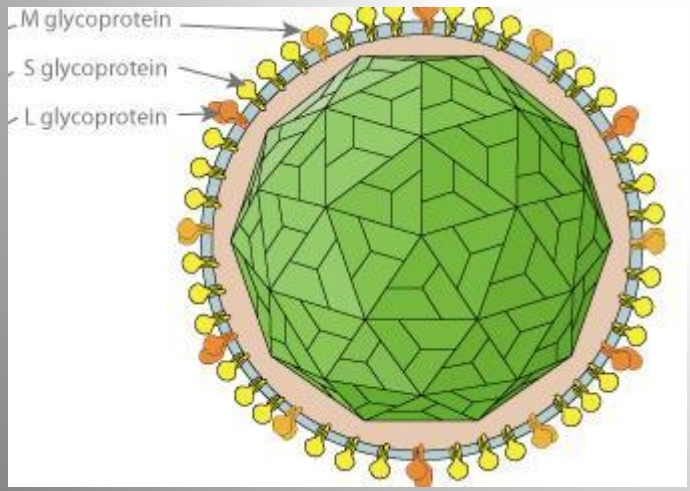
Hepatitis A virus (HAV)



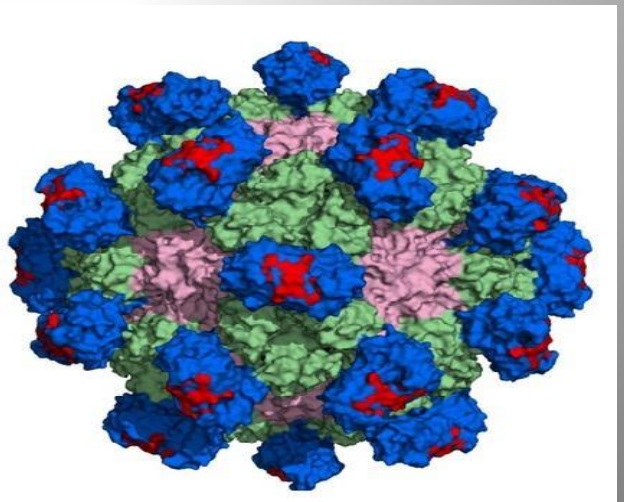
Hepatitis B Virus (HBV)



Hepatitis C Virus (HCV)



Hepatitis D Virus (HDV)



Hepatitis E Virus (HEV)

Introduction..

- Chronic viral hepatitis may lead to the development of cirrhosis, which may induce end-stage liver disease (ESLD)
- Complications of ESLD include ascites, edema, jaundice, hepatic encephalopathy,infections, and bleeding esophageal varices.
- Therefore, prevention and treatment of viral hepatitis may prevent ESLD.
- Viral hepatitis can occur at any age and is the most common cause of liver disease in the world.

Hepatitis A

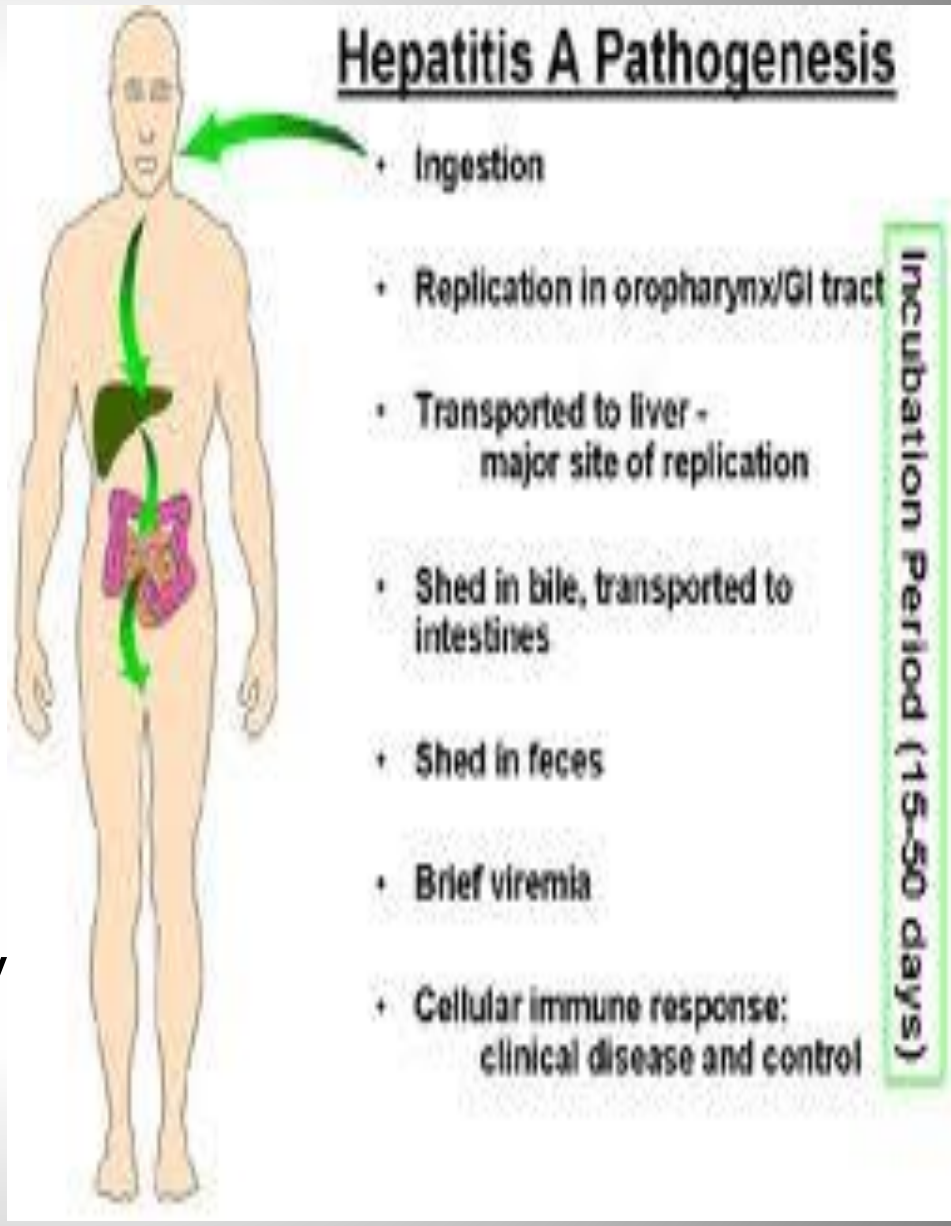
- It is usually benign, self limiting disease and has an incubation period of 15-45 days
- It is spread by faeco-oral route
- The spread is related to close personal contact such as in overcrowding, poor hygiene and poor sanitation

Pathogenesis

An immunologic basis is suspected

These markers are:

- IgM anti-HAV antibody appears in the serum at the onset of symptoms of acute hepatitis A
- IgG anti-HAV antibody: it is detected after IgM antibody and gives life long protective immunity against reinfection with HAV

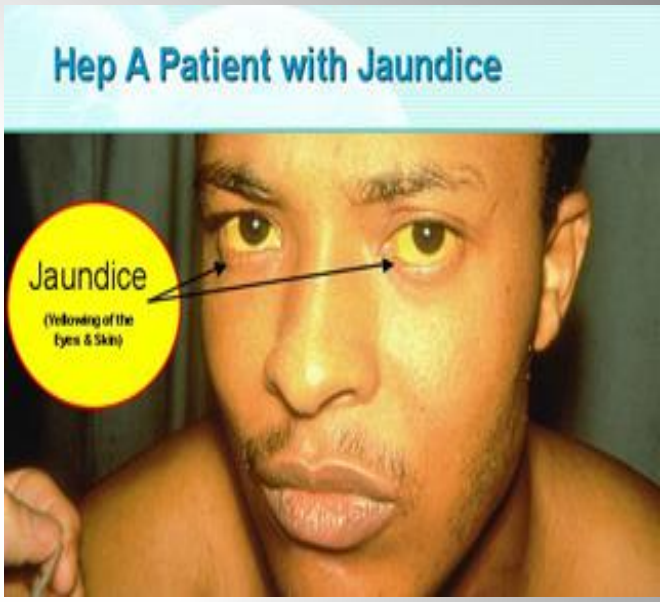


Risk Factors for Acquiring Viral Hepatitis

Hepatitis A

- International travelers to endemic areas (e.g., Africa, Asia, and parts of South America)
- Sexual contact with infected persons (e.g., men having sex with other men)
- Shellfish infected with HAV (e.g., raw oysters)
- Day care centers or household contacts with people infected with HAV
- Health care workers
- Intravenous drug users using unsterilized needles
- Workers involved with non-human primates
- Food service handlers
- Individuals residing in health care institutions

Hepatitis A

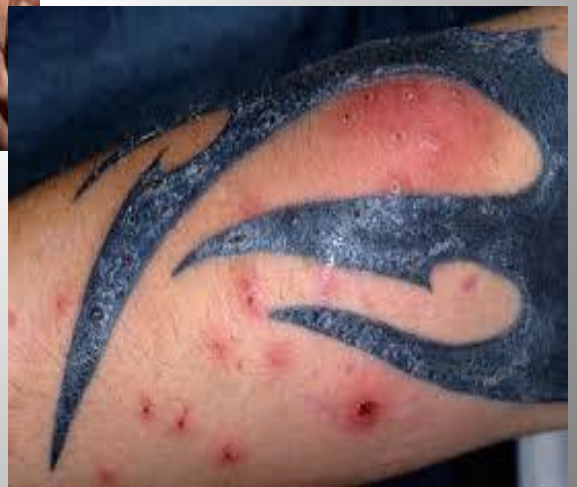


- Nausea
- Loss of appetite
- Vomiting
- Fatigue
- Fever
- Dark urine
- Pale stool
- Jaundice
- Stomach pain
- Side pain

A person may have all, some or none of these

HepatitisB

- Incubation period: 30-180 days
- Transmitted parenterally like blood transfusions, intravenous drug addicts, patients treated by renal dialysis, hospital workers exposed to blood and by intimate physical contact such as from mother to child and sexually.
- It causes severe form of hepatitis from acute hepatitis to cirrhosis
- It may also cause hepatocellular carcinoma



Pathogenesis

- The evidence linking immuno pathogenetic mechanism with hepatocellular damage is much stronger in HBV infection than with HAV infection.
- In support of immune pathogenesis is the demonstration of several immunological markers (serologic as well as viral) molecular and morphologic evidence that hepatocytic damage is initiated by virus-infected CD8+ T cytotoxic cells.

Serologic and viral markers

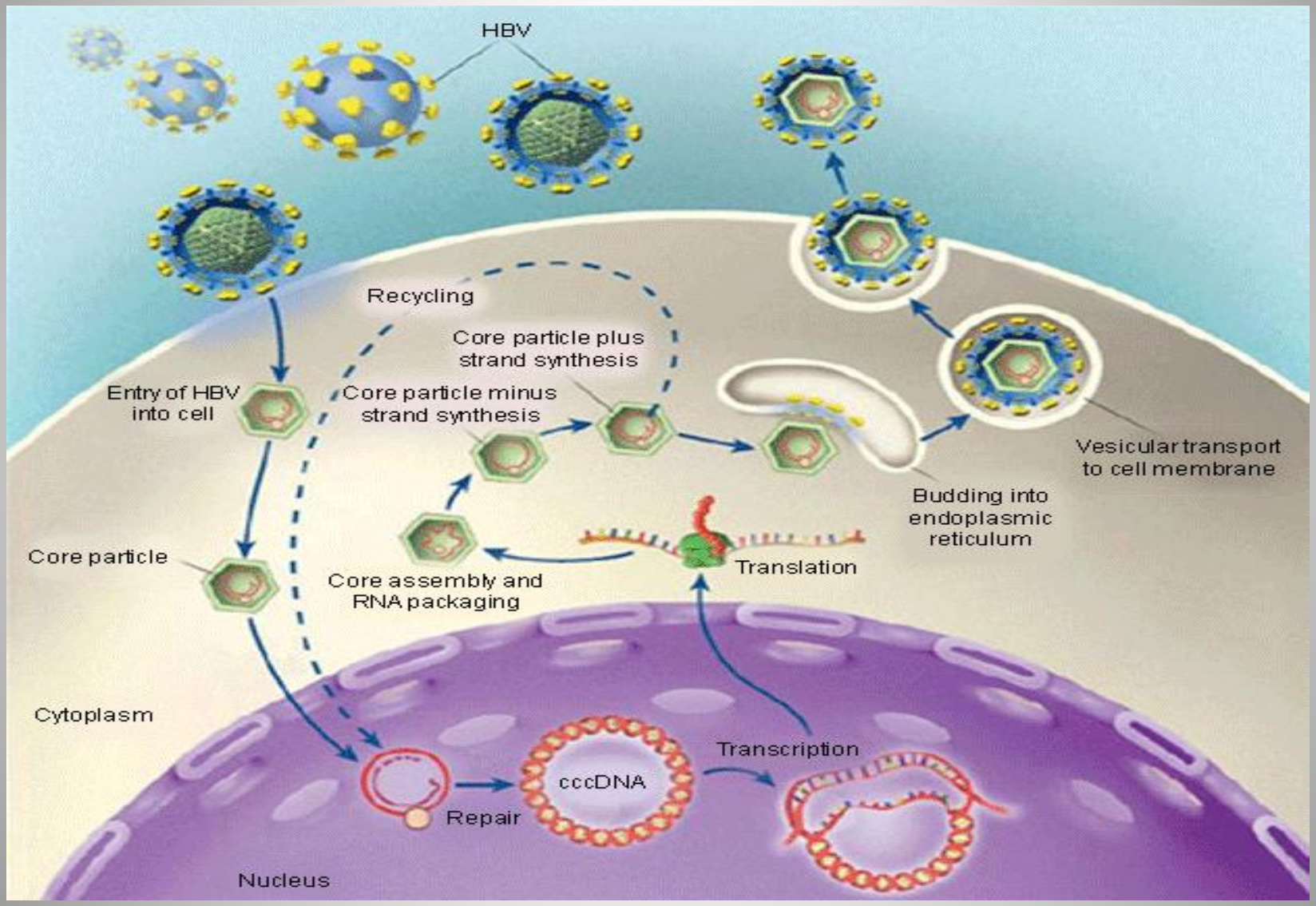
- various immunological markers indicative of presence of HBV infection can be demonstrated in the sera as well as in the hepatocytes of infected individuals, these are
- HBsAg: it appears early in the blood after about 6 weeks of infection and is an indicator of active HBV infection.
- Its persistence for more than 6 months implies a carrier state

- Anti-HBs: appear late, after 3 months of onset, may be both IgG and IgM
- HBeAg: present 3-6 weeks during an acute attack
- If it is present beyond 10 weeks then it is an indicative of carrier state
- AntiHbe: appears after disappearance of HBeAg
- HBcAg: it is detected in the nuclei of hepatocytes in carrier state and in chronic hepatitis
- Anti-HBc: IgM and IgG
- HBV-DNA: it is present in pre-symptomatic phase and during early acute stage

Pathogenesis

- Hepatitis B Virus (HBV) can recognise bind to specific receptors on the host liver cells.
- After binding, it will release its genetic materials into the cell which migrates to the nucleus.
- In the host cell's nucleus, the partially double stranded is completed into a circle of HBV DNA.
- The host cell's RNA polymerase is duped into transcribing the foreign genome.
- The HBV mRNA is then translated into new HBV.
- The new HBV particles are formed and has its viral genome packaged within.
- It then buds off (exocytosis) from the host cell to infect other host cells. In the process of translating the HBV genome, the host cell will translate HBV protein coat continuously.
- When there is too much of the protein coat which acts as the HBV surface antigen is produced, it will be delivered out of the host cell and trigger an immune response from the host body.

Pathogenesis…



Pathogenesis…

- The virus does not directly kill hepatocytes.
- The host's immune response to viral antigens is thought to be the cause of the liver injury in HBV infection.
- The cellular immune response, rather than the humoral immune response, seems to be primarily involved in disease pathogenesis.
- Induction of antigen-specific T-lymphocyte response is thought to occur when host T lymphocytes are presented with viral epitopes by antigen-presenting cells in lymphoid organs.
- These antigen-specific T cells mature and expand and then migrate to the liver.

Pathogenesis…

- In acute HBV infection, most HBV DNA is cleared from hepatocytes through non-cytocidal effects of inflammatory byproducts of CD8+ T lymphocytes, stimulated by CD4+ T lymphocytes, notably interferon-gamma and tumour necrosis factor-alfa.
- These cause down-regulation of viral replication, and trigger direct lysis of infected hepatocytes by HBV-specific CD8+ cytotoxic T cells.
- In contrast, people with chronic HBV infection display weak, infrequent, and narrowly focused HBV-specific T-cell responses, and the majority of mononuclear cells in livers of chronic HBV-infected people are non-antigen-specific

Hepatitis B

- Symptoms
  - Nausea
  - Loss of appetite
  - Vomiting
  - Fatigue
  - Fever
  - Dark urine
  - Pale stool
  - Jaundice
  - Stomach pain
  - Side pain

A person may have all, some or none of these

Hepatitis D

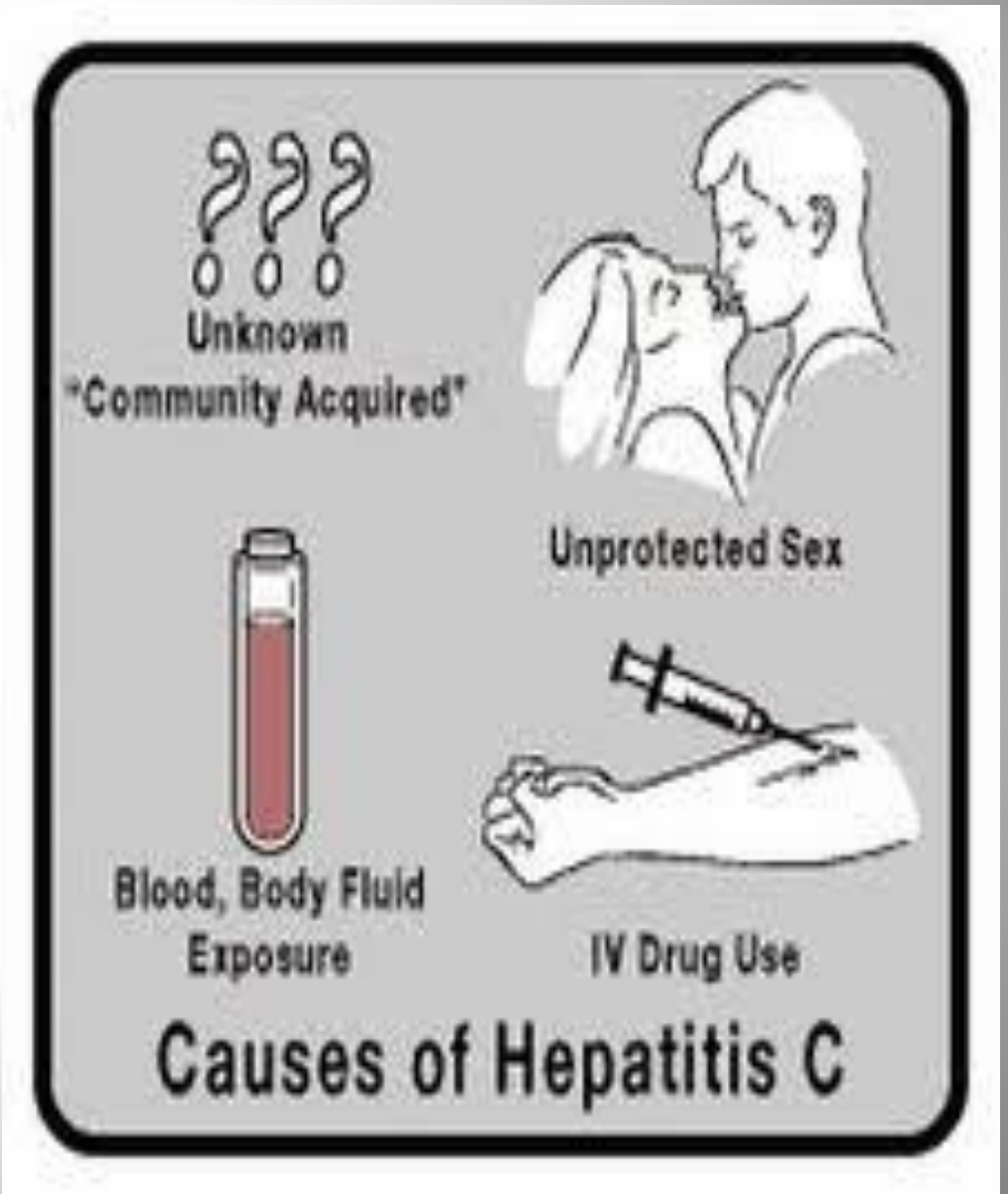
- Infection with delta virus in the hepatocyte nuclei of HBsAg positive patients is termed hepatitis D.
- It affects individuals with hepatitis B infection
- The high risk people for HDV infection are the same as for HBV infection

Hepatitis C

- Mode of transmission: blood transfusions, heamodylasis, needle pricks in health workers
- Incubation period: 20-90 days
- It is one of the main causes of chronic liver disease
- Cell mediated immune mechanism plays an important role in hepatocytic injury
- Perhaps, HCV infection of lymphoid cells may play a role in immunologic injury to hepatocytes

Hepatitis C:

- Called HCV.
- Direct contact with blood.
- Unprotected sex.

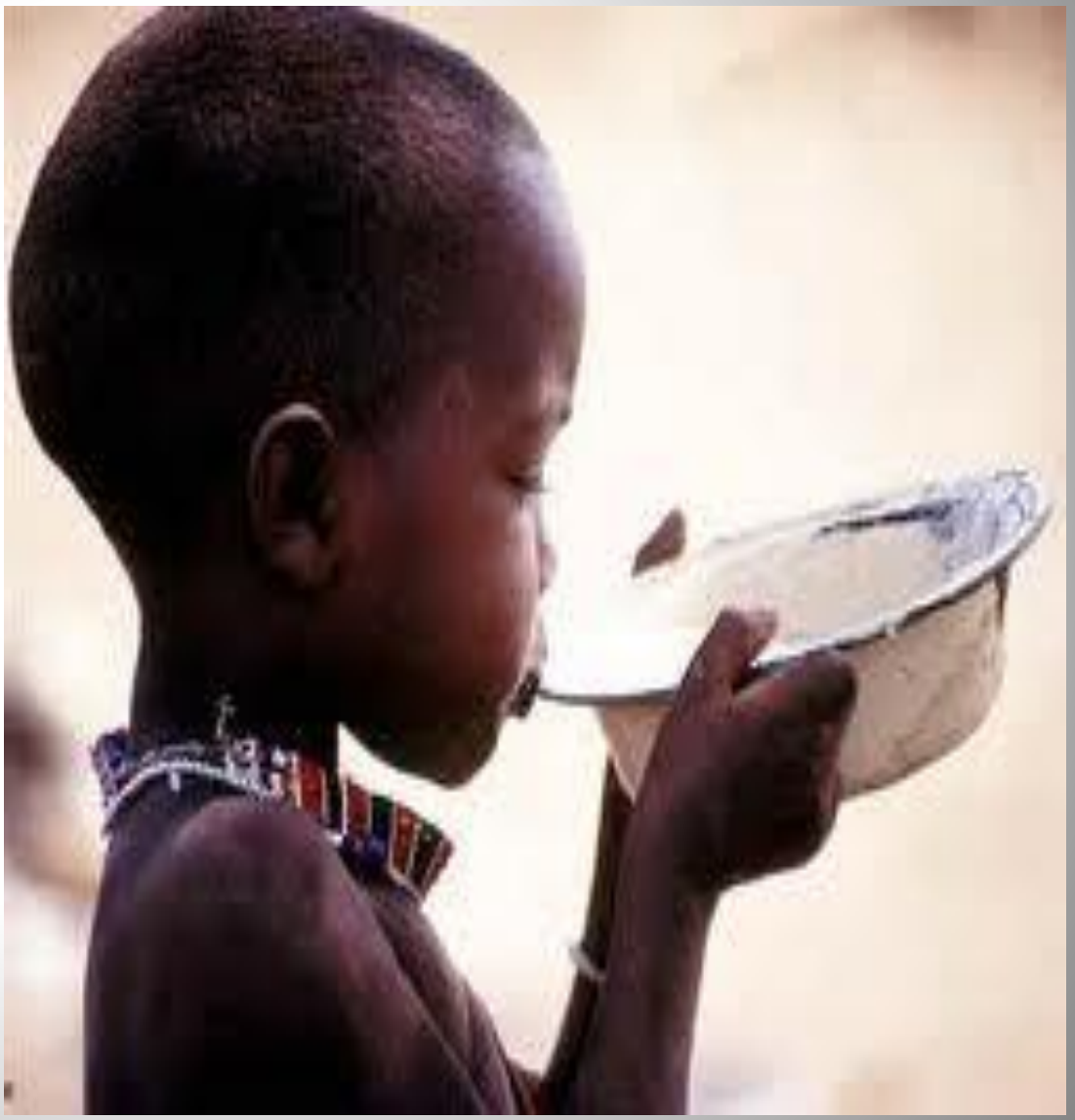


Hepatitis D:

- Called HDV.
- Already infected with HBV.
- Infected blood
- Unprotected sex.
- Infected needles.

HEPATITIS E :

- Drinking water.
- Anal or oral sex.
- Similar to HAV.



Factor	Hepatitis A (HAV)	Hepatitis B (HBV)	Hepatitis C (HCV)	Hepatitis D (Delta Hepatitis)	Hepatitis E (HEV)	Hepatitis F	Hepatitis G (HGV)
Occurrence	Epidemic in areas of poor sanitation; common in fall and early winter	World-wide, especially in drug addicts, homosexuals, people exposed to blood and blood products; occurs all year	Post-transfusion, those working around blood and blood products, IV drug users; occurs all year	Hepatitis D virus causes hepatitis only in association with hepatitis B virus and only in presence of HBsAg	Parts of Asia, Africa, India, and Mexico where there is poor sanitation	Is rare and difficult to diagnose because of lack of testing methods	Associated with chronic viremia lasting 10 years; rarely causes frank hepatitis
Incubation Period	About 30 days	6 weeks to 6 months; mean 12-14 weeks	6-7 weeks	New cases now infrequent; same as for hepatitis B	14-60 days; mean 40 days	-	-
Risk factors/ High-risk groups	Close personal contact or by handling feces-contaminated wastes; poor sanitation; people who work with animals from HAV endemic areas or who eat raw or steamed shellfish	Health care workers in contact with body secretions, blood, and blood products; hemodialysis and post-transfusion clients; homosexually active males and drug abusers	Similar to that for hepatitis B; also, IV drug use, intranasal cocaine use, body peircing, multiple sex partners	Same as for Hepatitis B	Traveling or living in areas where incidence is high	-	Health care workers in hemodialysis, IV drug users, hemodialysis clients, chronic hepatitis B or C clients
Transmission	Infected feces, fecal-oral route; may be airborne if copious secretions; shellfish from contaminated water; no carrier state	Most cases in United States now result from heterosexual transmission; contact with blood and body fluids; carrier state	Contact with blood and body fluids; source of infection uncertain in many clients; carrier state	Co-infects with hepatitis B; close personal contact; carrier state	Fecal-oral route; food-or water-borne; no carrier state	-	Percutaneous
Severity	Mortality low; rarely causes fulminating hepatic failure	More serious, may be fatal	Can lead to chronic hepatitis	Similar to hepatitis B; more severe if occurs with chronic hepatitis B; increased risk of hepatocellular carcinoma	Illness self-limiting; mortality rate in pregnant women 10%-20%	-	Does not appear to cause liver disease
Diagnostic Tests	Anti-HAV-IgM-positive in acute hepatitis; IgG-positive after infection	HBsAg, HBV-DNA, anti-HBc-IgM, HbeAg, anti HBsAg	Anti-HCV or anti-HDV, HCV RNA	HDAg-positive (anti-HDV), HDV RNA serum	Anti-HEV	-	Anti-HGV
Prophylaxis and active or	Hygiene; immune globulin (passive),	Hygiene, avoidance of risk factors; HBIG (passive), recombinant	Hygiene anti-HCV interferon alfa-2b in combination	Hygiene; hepatitis B	Hygiene, sanitation; no	-	Hygiene