Hepatitis Viruses

Many viruses cause Hepatitis , .. of these five are commonly describe as Hepatitis V.

❶Hepatitis (A) viruses(HAV)

❷Hepatitis(B) Viruses (HBV)

❸Hepatitis(D) Viruses (HDV(

❹Hepatitis(E) Viruses (HEV)

❺Hepatitis(C) Viruses (HCV)

Other Viruses e.g.

Epstein Bar virus EBV

Cytomegalo virus CMV

Yellow fever Viruses

Causes inflammation of the liver but not called Hepatitis Viruses

Hepatitis A virus (HAV)

- Replication
  - Similar that of Enterovirus and poliovirus
- V. belong to Atypical Enteroviruses classified in picornaviridae virus family also called heparna virus or Enterovirus 72
- Cause Hepatitis A disease
- Transmission of epidemiology
  - HAV unlike HBV , it is rarely transmitted via blood because Level of viraemia is low
  - Chronic infection does not occur.
  - Transmitted by fecooral route
    - V. appear in faces 2 weeks before appearance of symptoms
  - Children are most frequently infected group
- The virus has following properties
  - Replication in cytoplasm of the host cell
  - SS+RNA
  - Icosahedra
  - Non Enveloped

Pathogenicity & immunity

- Pathogenicity is not completely understood
- No CPE in tissue culture infected by HAV
- There is no chronic infection
- Hepatitis caused by deferent viruses that can not be distinguished Pathologically

- IgM antibodies early detected at the first time of jaundice
  ↓ Then
  IgG Remain & produce for long time
- HAV. Probably replaced in GIT
  ↓
  Spread via blood
  ↓
  Liver
  ↓
  Hepatocyte are infected
- HAV unlike HBV, there is no evidence, that the immune attack on the hepatocytes play a role in pathogenesis

Clinical finding

- Clinical manifestation of hepatitis is same regardless of which hepatitis virus cause
  - **include**
    - Fever
    - Anorexia
    - Nausea
    - Vomiting
    - Jaundice
    - short incubation period
    - Most of cases Asymptomatic
    - Most cases resolve spontaneously in 2-4 weeks whereas in HBV it 10-12 weeks
- Lab. dx
  - Detection of IgM
  - 4fold rise of IgG Ab titer
  - Isolation of the virus
- Treatment & control
  - No antiviral drugs
  - Vaccination
    - Passive immunity
      - Hyper —immune serum
    - In activated vaccine
  - Proper hygiene

Hepatitis B virus (HBV)

- Disease
  - Hepatitis B
- Properties
  - Size g 22 nm particle
  - Within the core there is DNA depended DNA polymerase
  - Icosahedra nucleocapside
  - There is surface or antigen(HBS Ag)
  - Enveloped
  - Partially ds circular DNA genome
  - Under electron microscope, the patient serum reveals three different types of particles with deferent sizes
    - ❶ Long Filamented of 22 nm wide
    - ❷ Many 22 nm Spherical
    - ❸ Few 42 nm version
  - Another important Ag
    - Page 6
- V. belong to family hepadna

Another important Ag

Core Ag
(HBC Ag)

HBE Ag (HBE Ag)
↓
HBE Ag indicator
of transmissibility

Both of them are located in the
core but have different In
important antigenicity

Hepatitis Bs has
group surface Ag
↓
A of 2 set of group
surface Ag

d or y | **w or r**

This lead to 4
serotypes

adw | **adr** | **ayw** | **ayr**

This is useful in
epidemiological study because
there are concentrated in
certain geographic area

Transmission & epidemiology

- The most important mode of Transmission is via blood
  - Needle stick injuries can transmit the V. indicated that only very small amount of blood in necessary to produce disease as in case of drug users
- Sexual Transmission
- From mother to her children
- Very important notice
  - Enveloped. V. e.g. HBV are more sensitive to environment than non Enveloped VS.
    - So: Enveloped Vs. are more efficiently transmitted by closed (intimate) contact, like sexual contact or blood
    - while: Non Enveloped viruses like HAV are quit stable & they are transmitted well via the environment e.g. fecal, oral, transmission
  - HBV is found high in area in which high evidence of hepatoma indicated HBV may be tumor human viruses
    - Because: Immunization against HBV lead to reduce of incidence of Hepatoma

Pathogenesis & immunity of HBV

Man get infection through the blood

↓

Infection of hepatocyte cause

- Necrosis
- Inflammation

Immune response against viral Ag on infected hepatocyte play a very important role in pathogenesis because

- Ag — Ab complexes cause some early
  - Some complication in chronic hepatitis
    - e.g
      - Vascuilitisi
      - immuncomplex glomeralonehphritis
  - arthralagia
- HBV-DNA are exist primarily as episome in the cytoplasm of persistently infected cells

  ↓

  But small amount of HBV – DNA is integrated into host cell

  ↓

  So high rate of hepato cellular carcinoma occur in chronic cariered
- Immunity

  ↓

  long life Immunity mediated Ab against HBV
- About 10% of patients with HB become chronic carrier of (HBV unlike HAV) patients

  ↓ this

  Attributed to persistent infection of hepatocytes

  ↓

  Prolonged presence of HBV & HBS Ag in the blood

Clinical finding

- HB l.p
  - 12 – 10weeks this is more longer than that of HA 3 – 4 weeks
- More chronic carrier are asymptomatic but some have chronic hepatitis which lead to liver cirrhosis and death
- Many HBV infection are a symptomatic & detected only by presence of HBS Ab
- Clinical symptom similar to that of other hepatitis but with HBV
  - Symptom more sever
  - Life threatening

Treatment of prevention of HBV infection

Treatment

Alfa interferon is clinical important for Treatment of chronic hepatitis B infection

Prevention

either by

❶Hyper immunoglobulin (anti HBS IG) of high titer HBs Ab

is used to provide

Immediate passive protection to individual sexually contact with HBS Ag person&neonat from infected mothers

❷Vaccination

Page 11

Or Both of them

❸Any person with a history of hepatitis (of any type) should not donate blood because NA HB virus may be present

❹All blood for transfusion should be screened for HBS Ag

Vaccination

In activated Vaccine consisting of HBs — Ag prepare from spherical particles purified from the serum of infected individual was used

Vaccine contain HBS - Ag produced in yeast by genetic engineering technique

Both of them is highly effective preventing HB

This Vaccines mainly use for

- users of narcotic drugs (illicit drugs)
- Patient with sexual transmitted disease
- Patient receiving Multiply transfusion blood
- Health care person
  - Dentist
  - Medical staff
  - Lab workers
  - Surgeon

Non – A, Non B Hepatitis viruses

Hepatitis C Viruses (HCV)

Transmission

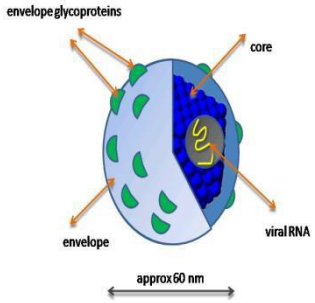
- Via blood
- Sexual contact like HBV

Treatment and prevention

- No vaccine
- No specific antiviral drugs but alpha IFN is provide for use in chronic active HCV
- No antibodies

Properties

- Classified as member of Flaviviruses family
- Envelope
- SS+ RNA genome → Resembling yellow fever virus



Structure of Hepatitis C Virus

Clinical finding

- The ensuring chronic liver disease and predisposition of cellular carcinoma
- Resemble HB as far as infection

Hepatitis D Viruses

It is unusual virus because

Named: delta or defective Delta agent (HDV)

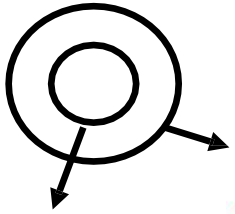
So (HDV) is defective virus because it is Genome does not carry code for it is own envelope protein

So HD infection can occurs only in patients previously infected by HBV since the V. can replicate only in

Transmission

Via blood

Genome Surrounding by envelope composed of HBS Ag

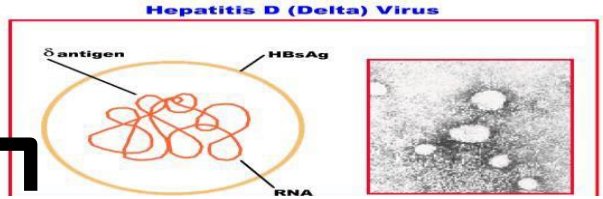


Envelope of HB containHBSAg

SS - RNA circular

Lab .dx

Detection of HD – Delta Ag- IGM AB



Sexual contact like HBV

Severity

Chronic carrier state can occur

It has small RNA genome (SS – circular RNA with no sequence homology to HB V. D NA(

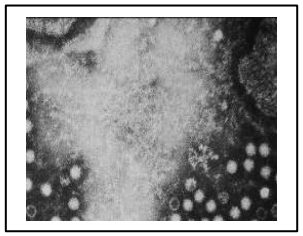
Treatment & prevention

No vaccine is available

Neither Treatment

Hepatitis E Viruses (HEV(

Hepatitis E virus (HEV) is a member of calicivirus family ss+RNA



Clinical manifestation

- Clinically similar to a cut hepatitis A which include

Page 15

- Incubation period
  - ↓
  - 70 –10day (40 day(

Character

- SS+ RNA
  - 2subtype A
    - ↓
    - Burma subtype
    - Mexico subtype
- Spherical non-envelope
- icosahedra l particles

Epidemiology

- Route of transmission
  - ↓
  - Fecooral route and it is water born causing of hepatitis especially in children and some time fatal in pregnancy women
- Distributed in developing countries especially , Asia , Africa

Clinically similar to a cut hepatitis A which include

- Preictoric period
  - Loss of appetite , B
  - Vomiting
  - Abnormal pain
  - Nausea
  - Diarrhea
- Ictoric period
  - Urine deepnes
  - Jaundice appear on skin and sclera within 2 weeks
- Convalescent period
  - Jaundice disappear gradually
  - Liver and spleen function return normal

DX

Serologically

- Anti HEIgG
  Anti HEIgM
- RT – PCR
- IF
  IEM
  In feces

Prevention

- Best sanitation
- Vaccination