Epidemiology of Viral Hepatitis

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435 Lecture Notes by Qusay Ajlan & Haifaa Almohsen

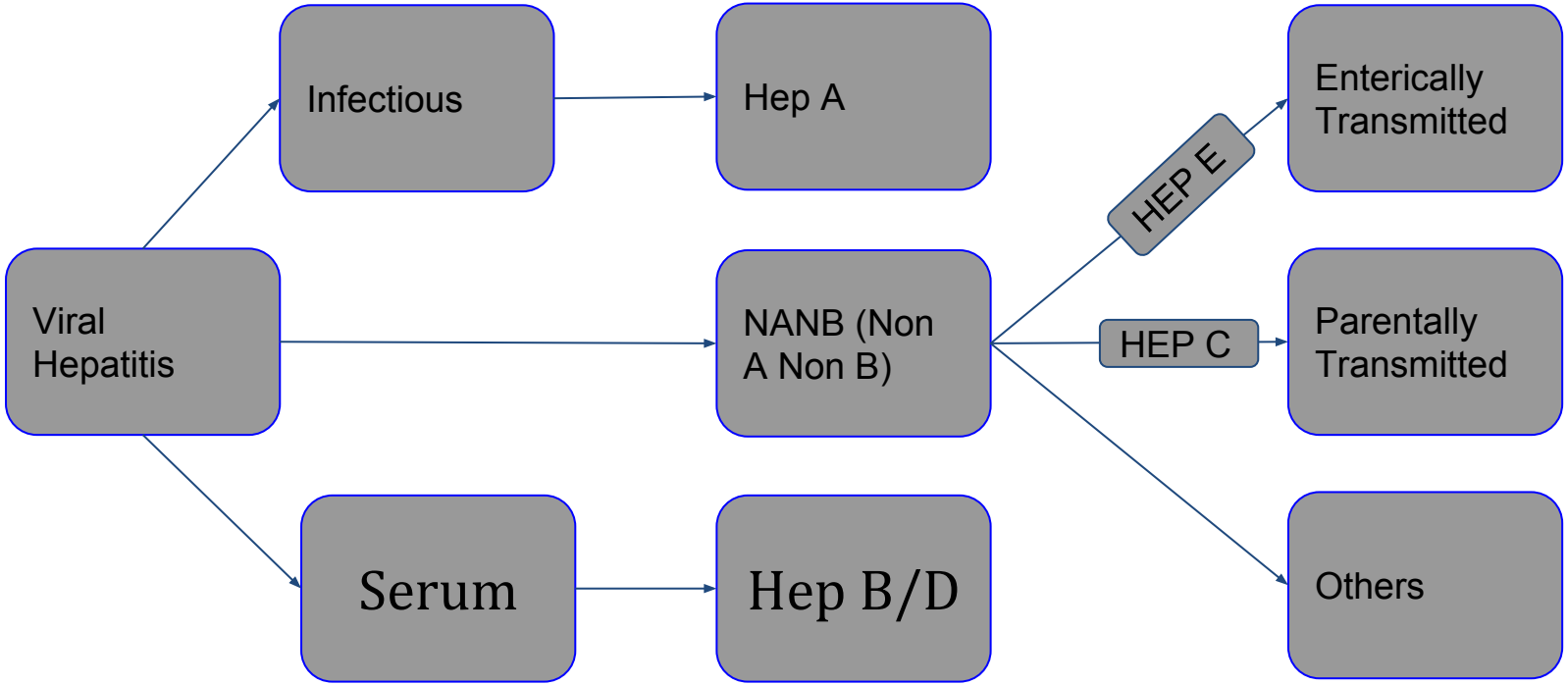
Original Content | **Titles** | Additional Notes | **Important**

Objectives

At the end of the lecture students should be able:

- Understand Classification of viral hepatitis.
- Recognize the magnitude of viral hepatitis infections.
- Understand modes of transmission of different serotypes.
- Understand measures of prevention and control of different serotypes of viral hepatitis.

Viral Hepatitis – Classification & Historical Perspective



Hepatitis A

Clinical presentation:

- More than **90% are asymptomatic**
- IF SYMPTOMATIC Abrupt onset.
- Fever
- Malaise
- Anorexia
- Abdominal discomfort
- Jaundice
- Seroprevalence **increases with age.**

SEROPREVALENCE = the number of persons in a population who test positive for a specific disease based on serology

- At age 15, 95% are seropositive.
- Case fatality rate (CFR)= 0.3%. If age > 40 years CFR=2%.
- **Studies in KSA:** (1997 25%)(1999 25% Taif)(10-82% Jazan (1-12 years)

Chain of infection

- **Agent**: RNA virus
- **Reservoir** : Human (Clinical & subclinical cases)
- **Incubation period**: 15-45 days (median one month).
- **Period of communicability** : Last two weeks of I.P. (incubation period) + one week of illness.
- **Modes of transmission**:

  Fecal-oral route.

  Common source outbreaks.

  Blood transfusion (rare).

Prevention and Control

- **Good sanitation & personal hygiene**.
- "Careful hand washing"
- Day- Care centers

  Hand washing after every diaper change and before eating.

  Shellfish: heat at 85-90C for 4 minutes or steam for 90 seconds.

  Vaccine ? Inactivated **hepatitis A vaccine**
- Schedule 2 doses after 6 months interval.
- Intramuscularly.
- Protection after one month.
- Lasting immunity at least 10 years.
- Hepatitis A patient:

  Enteric precaution for the Period of communicability

Childhood Immunization Schedule in Saudi Arabia
January 2008

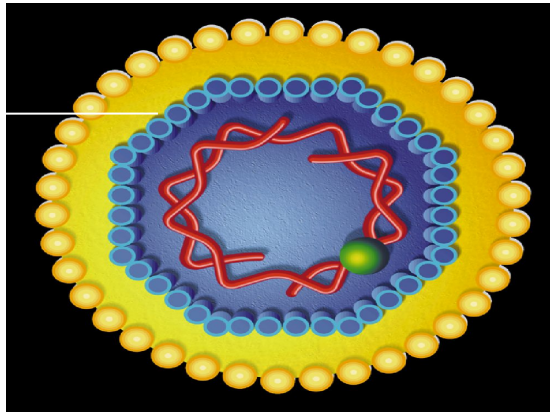
Age	Vaccine
At Birth	BCG, HepB
2 months	IPV (DTP, HepB, Hib)
4 months	OPV (DTP, Hep B, Hib)
6 months	OPV (DTP, HepB, Hib)
9 months	Measles (mono)
12 months	MMR, Varicella, OPV
18 months	OPV, DTP, Hib, Hep A
24 months	Hep A
4- 6 years	OPV, DTP, MMR, Varicella

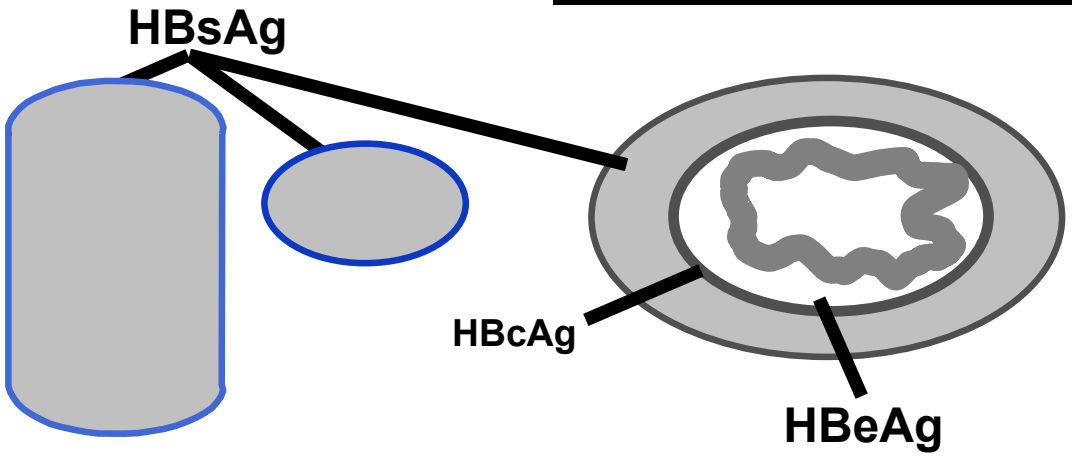
Hepatitis B virus

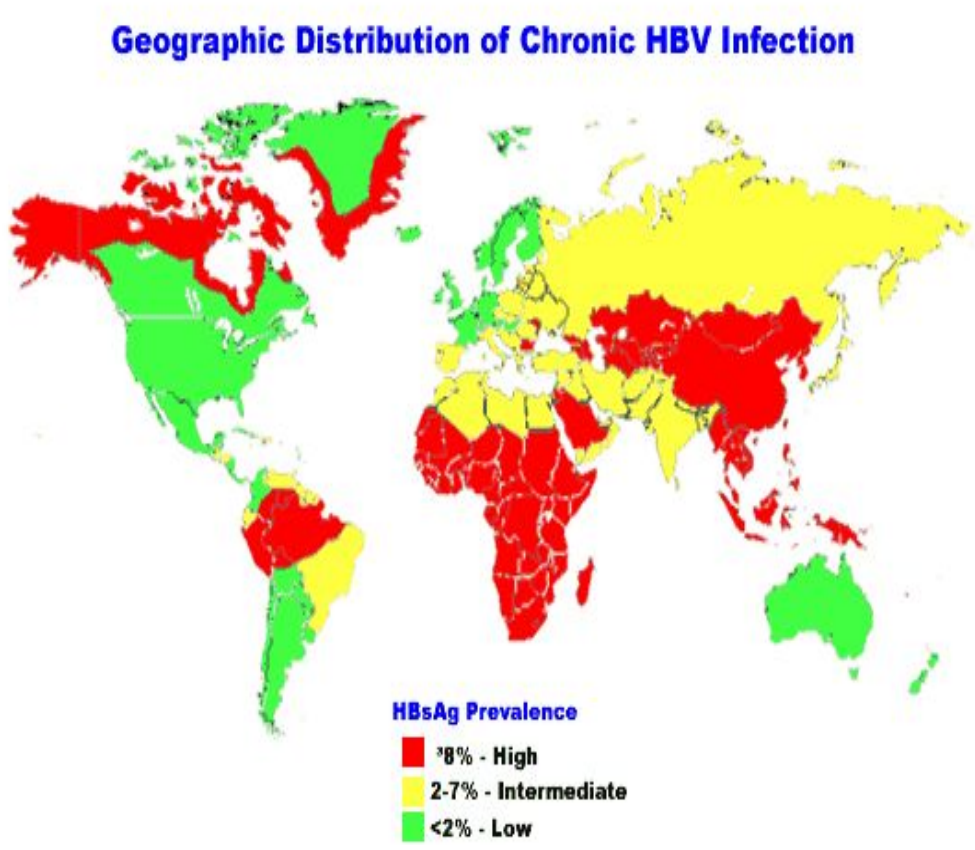
Clinical presentation:

- Insidious (gradual) onset.
- Anorexia.
- Abdominal discomfort.
- Nausea.
- Vomiting.
- Arthralgia.
- Jaundice.

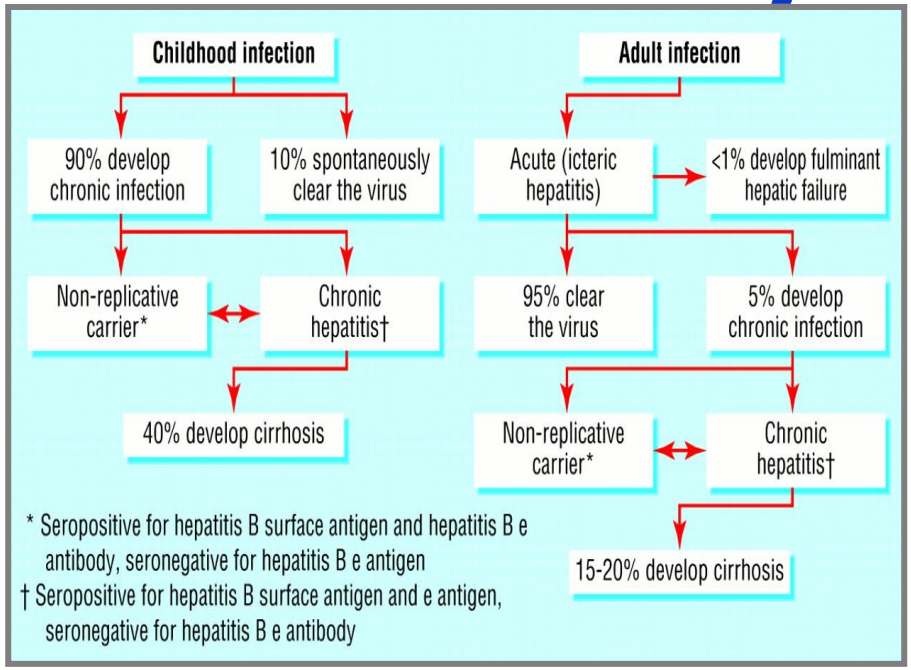
1. **The presence of HBsAg indicates active infection or chronic carrier.**
2. **Antibody to HBsAg, from either disease or vaccine, indicates immunity.**







Natural History



1)More than 500,000 death/year

2) billion people infected

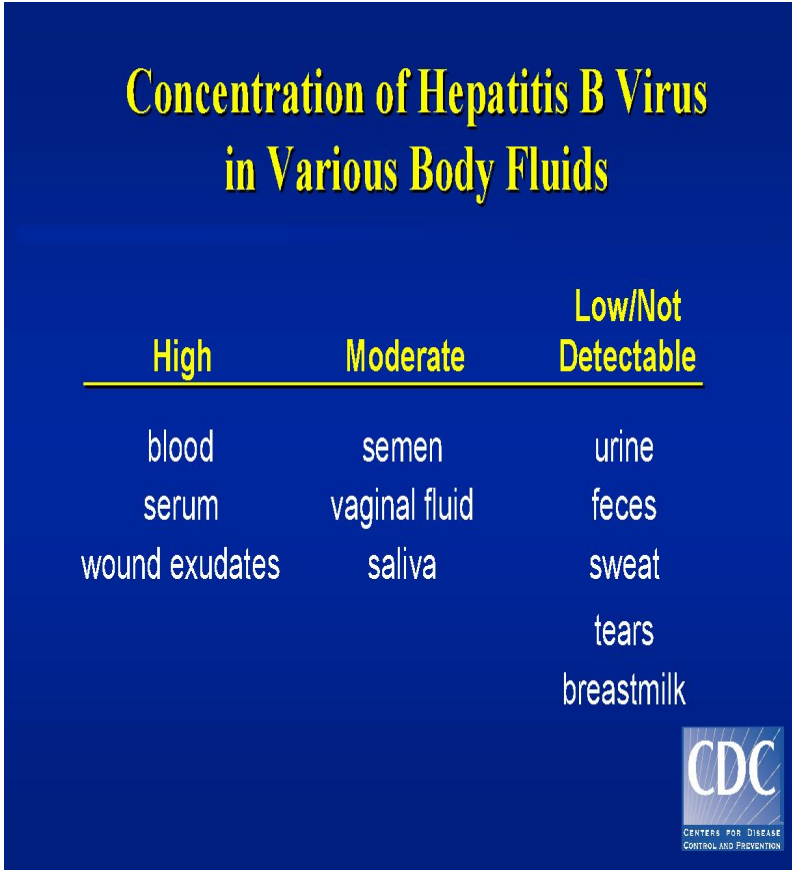
3) 360 million CHB

- **Carriage depends on age at infection;**
  - <5 yrs, 30%-90% chronicity
  - >5 yrs, 2%-10% chronicity

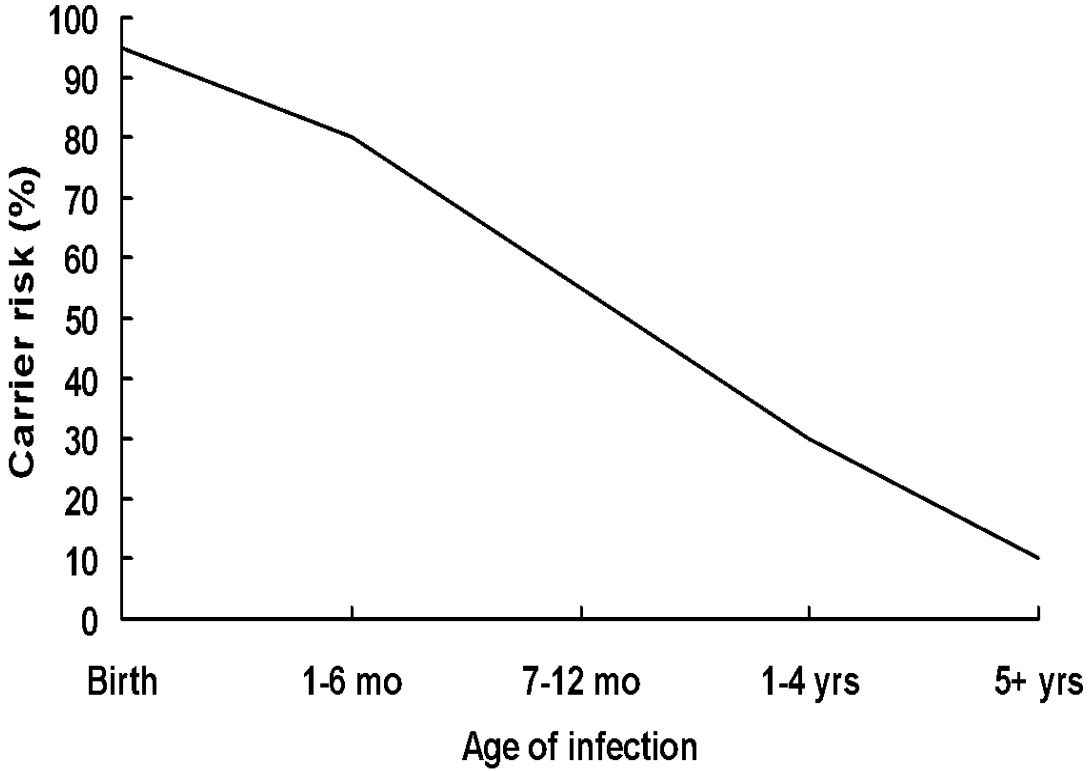
Chain of infection

- **Agent**: Double strand DNA.

  Serotypes adw, ayw, adr, ayr.
- **Reservoir**: Human (case + carrier).
- **I.P.** 2-3 months.
- **P.C.** One week of I.P. + illness period + carriage.



Risk of Chronic HBV Carriage by Age of Infection

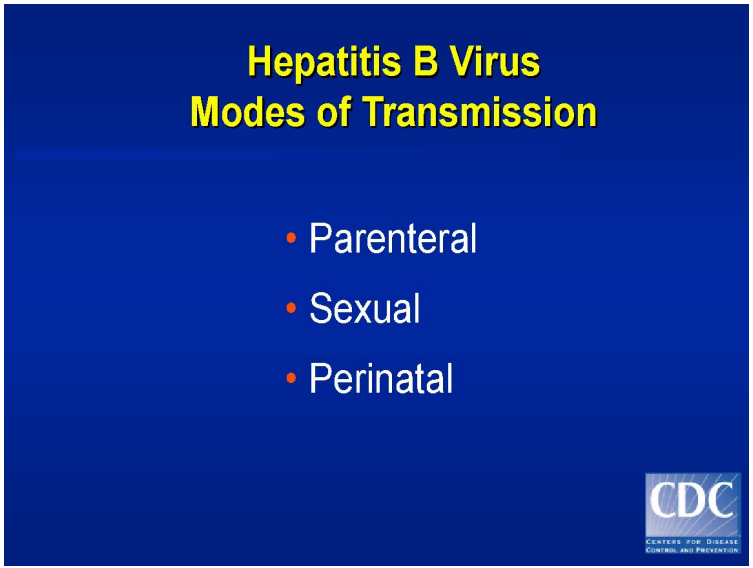


As we advance in age our chance to get Hep B decrases

Modes of transmission:

Percutaneous and permucosal exposure to:

- infective body fluids
- Blood transfusion
- Organs transplants
- Sharing needles
- Haemodialysis
- Needlestick
- Tattooing
- Razors & toothbrushes.



Sexual transmission.

Perinatal transmission especially when HBsAg carrier mothers are also HBeAg positive.

Prevention and control

- **Hepatitis B Vaccine**

Subunit recombinant HBsAg **IntraMuscular** in the deltoid region.

3 dose series, typical schedule 0, 1, 6 months - no maximum time between doses (no need to repeat missed doses or restart)

- Wide scale **immunization of infants** (revise compulsory vaccination schedule).
- **Immunization of high risk persons**.

Haemodialysis patients.

Bleeding disorders.

Susceptible households.

Health care personnel.

Prevention and control

- **Blood banks:**

1-Avoid donors from risky groups.

2-Education & history taking.

3-Testing for HBsAg.

- **Discourage:**

Tattooing, Drug abuse,

Extramarital sexual relations.

- **Needle stick**

Single dose of HBIG (hepatitis immunoglobulin) (24 hours).

Vaccine series.

Prevention and control

- **Sexual exposure**
  - Single dose of HBIG (14 days) and
  - Vaccination.

- **Infants to HBsAg +ve mothers.**
  - 0.5 ml HBIG (IM).
  - First dose of the vaccine.
  - 2^{nd} & 3^{rd} doses at 1 & 6 months later.

- **Health care personnel.**

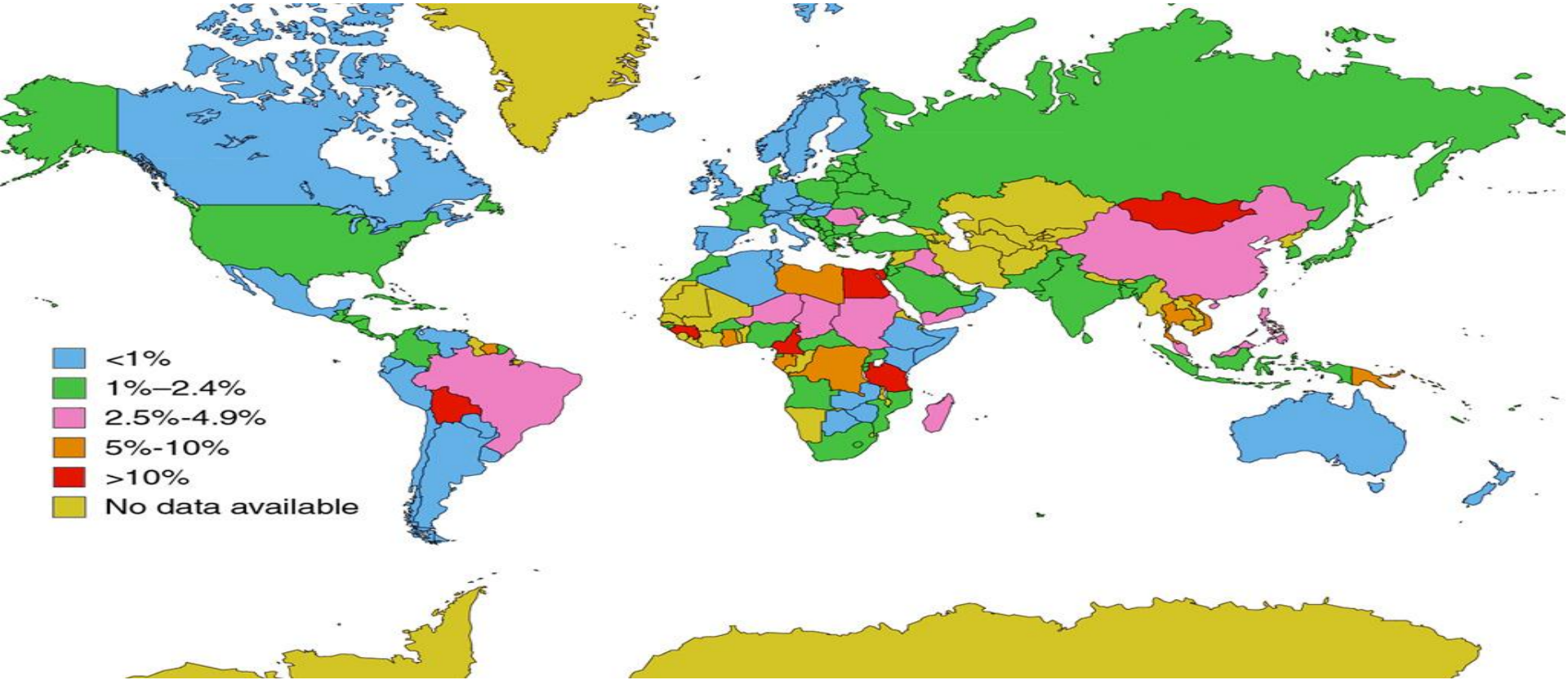
Universal precautions

Hepatitis C

170 Million Hepatitis C virus (HCV) carriers

3-4 MM new cases / year

Hepatitis C



AGE SPECIFIC PREVALENCE OF ANTIBODY TO HCV/ANTI-HCV AMONG HEALTHY SAUDIS

Age Group (years)	Community Based Study		
	No. tested	Anti-HCV Pos. (%)	Location
1 – 10	1214	0.6	Central Province
	490	0.0	Eastern Province
	677	0.4	North-Western Province
	1096	0.9	South-Western Province
	1019	1,9	Southern Province
10 – 19	504	6 (1.2)	Gizan
20 – 29	361	4 (1.1)	Gizan
30 - 39	290	6 (2.1)	Gizan
40 – 49	183	6 (3.3)	Gizan
> 50	144	5 (3.5)	Gizan
Total	1482	27 (1.8)	Gizan

PREVALENCE OF ANTIBODY TO HCV TO SAUDI HIGH RISK GROUPS

High Risk Group	No. Tested	No. Pos.	%	Location
Hemophiliacs	28	22	78.6	KKUH, Riyadh
Thalassaemia and sickle cell disease	78	26	33.3	KKUH, Riyadh
β-thalassaemia major	20	14	70.0	KKUH, Riyadh*
Sickle cell anaemia	55	10	18.2	KKUH, Riyadh*
Patients with sexually transmitted diseases	220	35	15.9	KKUH, Riyadh*

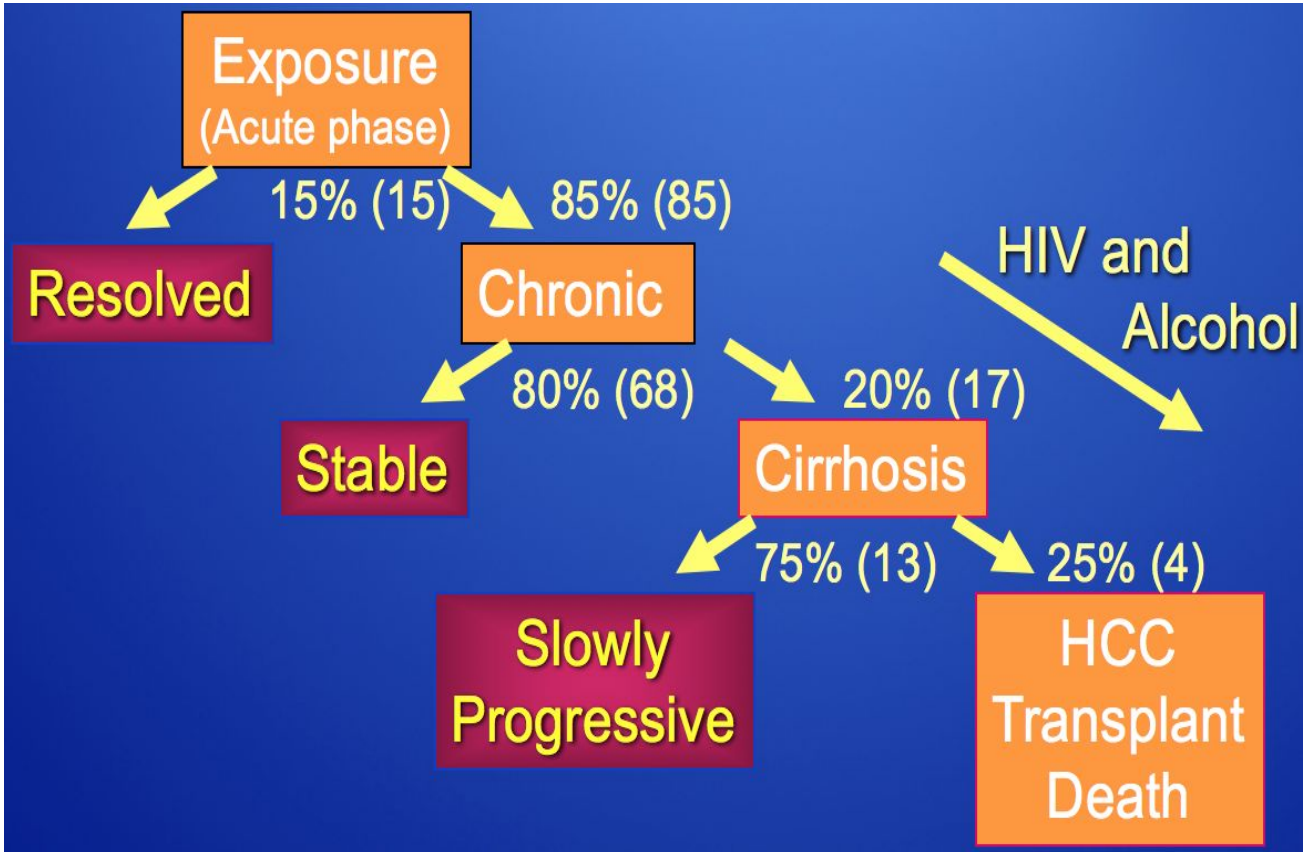
ANTI-HCV IN HAEMODIALYSIS PATIENTS IN SAUDI POPULATION

Author	No. of Persons	Type of Test	%
Fakunle et al	895	ELISA I	53.7
Al-Mugeriren et al	20 Children	ELISA I	45.0
Ayoola et al	74	ELISA I	41.9
Huraib et al	22 HD Centre 1147 Persons	ELISA II	68.8

Hepatitis C Virus Genotypes

- 11 (6 major) with many subtypes and quasispecies
- The predominant genotype in Saudi is Genotype 4 (62.9%)
- Europe & America Genotype 1→ 75 (24.8) %
  → severe disease
- Genotype 2 = 10.8 (7.4) %
- Genotype 3 = 5.8 (5.9) %
- Genotype 1 & 4 → Poor response to therapy

Natural History of HCV Infection

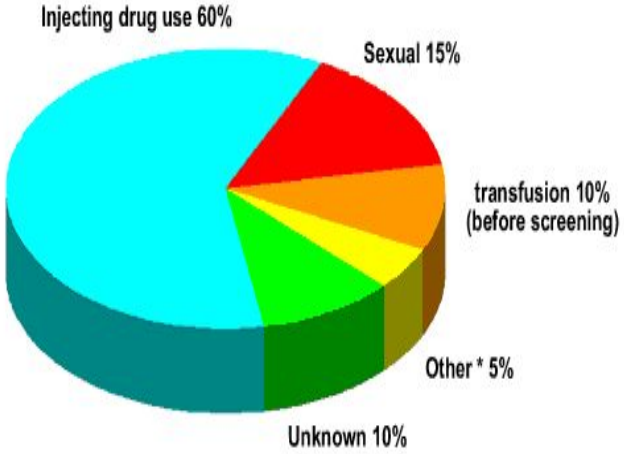


Important HCV Transmission Modes

Blood transfusion

1:100,000 in US

Sources of Infection for Persons with Hepatitis C



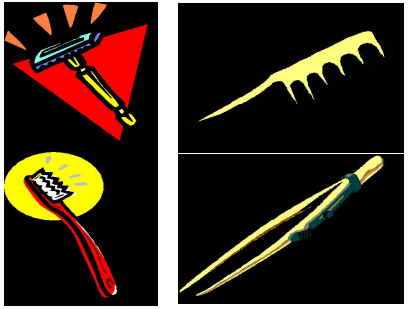
*Nosocomial: Health-care work; Perinatal

Source: Centers for Disease Control and Prevention

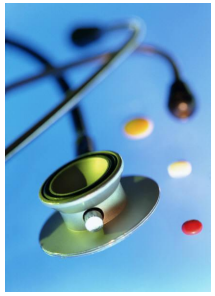
IV drug abuse

80% infected in first year

Un-common HCV Transmission Modes



household transmission



Needle stick injury 3%

Vertical transmission mother - Child 1-5%

HCV Counseling

Other Transmission Issues

- HCV not spread by kissing, hugging, sneezing, coughing, food or water, sharing eating utensils or drinking glasses, or casual contact
- Do not exclude from work, school, play, child-care or other settings based on HCV infection status

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Features of Hepatitis C Virus Infection

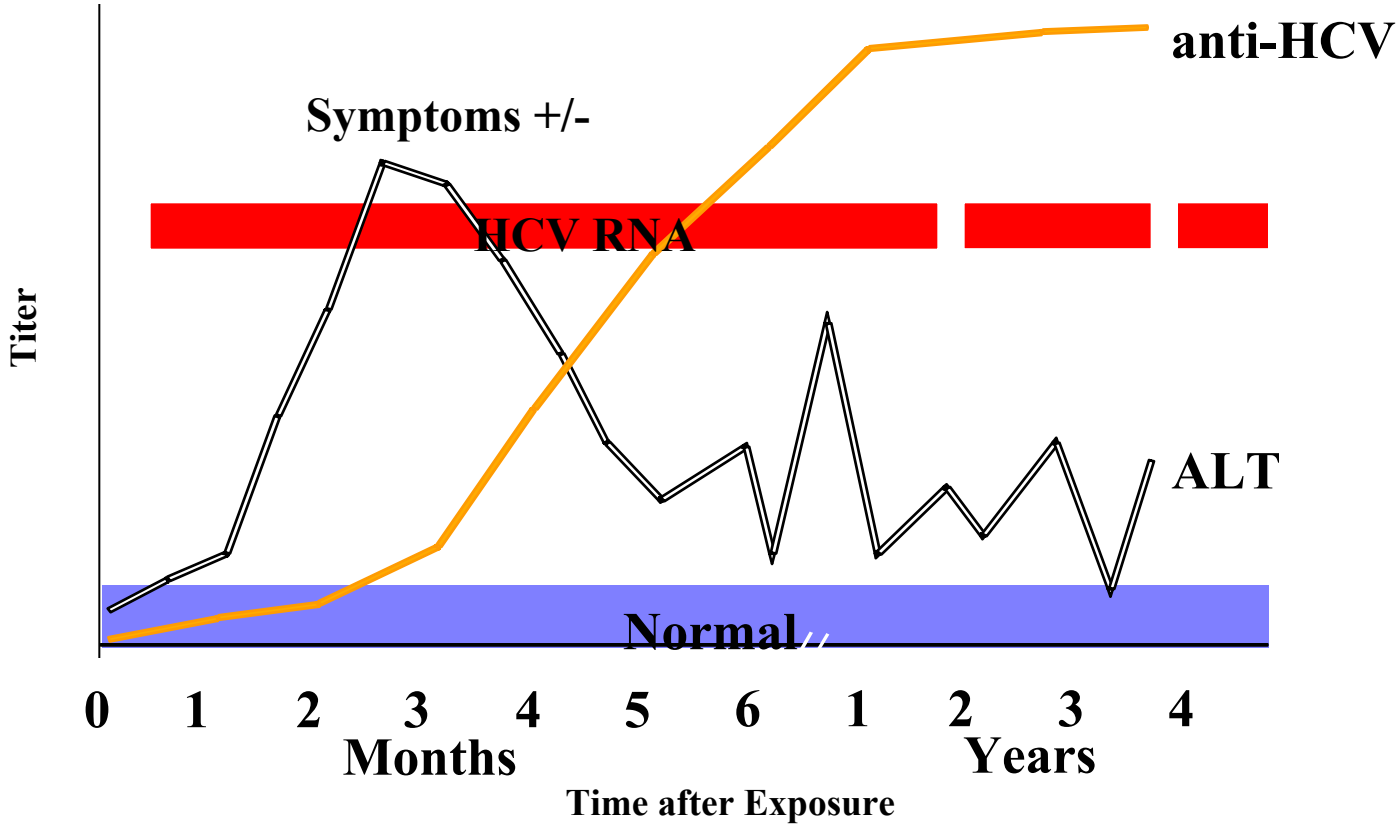
Incubation period	Average 6-7 weeks Range 2-26 weeks
Acute illness (jaundice)	Mild (≤20%)
Case fatality rate	Low
Chronic infection	60%-85%
Chronic hepatitis	10%-70%
Cirrhosis	<5%-20%
Mortality from CLD	1%-5%

Chronic infection , cirrhosis and chronic hepatitis are Age-related

Chronic Hepatitis C Factors Promoting Progression or Severity

1-Increased alcohol intake
2-Age > 40 years at time of infection
3-HIV co-infection
4-Other
- Male gender
- Chronic HBV co-infection

Serologic Pattern of Acute HCV Infection with Progression to Chronic Infection



Perinatal Transmission of HCV

- Transmission only from women HCV-RNA positive at delivery
  - Average rate of infection 6%
  - Higher (17%) if woman co-infected with HIV
  - Role of viral titer unclear
- No association with
  - Delivery method
  - Breastfeeding
- Infected infants do well
  - Severe hepatitis is rare

Sexual Transmission of HCV

- Case-control, cross sectional studies
  - Infected partner, multiple partners, early sex, non-use of condoms, other STDs, sex with trauma, **Partner studies**
  - Low prevalence (1.5%) among long-term partners
    - infections might be due to common percutaneous exposures (e.g., drug use), BUT
  - Male to female transmission more efficient
    - more indicative of sexual transmission

Household Transmission of HCV

- **Rare** but not absent
- Could occur through percutaneous/mucosal exposures to blood
  - Contaminated equipment used for home therapies
    - IV therapy, injections
  - Theoretically through sharing of contaminated personal articles (razors, toothbrushes)

Public Health Service Guidelines for Anti-HCV-Positive Persons

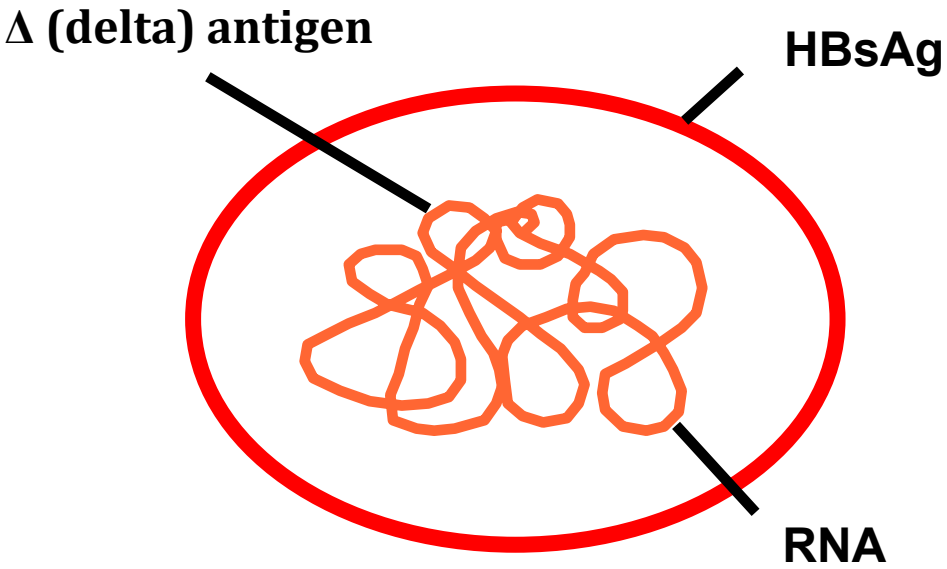
Anti-HCV-positive persons should:

- Be considered potentially infectious
- Keep cuts and skin lesions covered
- Be informed of the potential for sexual transmission
- Be informed of the potential for perinatal transmission
  - no evidence to advise against pregnancy or breastfeeding

Anti-HCV-positive persons should not:

- Donate blood, organs, tissue, or semen
- Share household articles (e.g., toothbrushes, razors)

Hepatitis D (Delta) Virus



HDV is a defective single-stranded RNA virus (delta Ag)

It requires HBV for synthesis of envelope protein composed of HBsAg

Hepatitis D - Clinical Features

- **Coinfection with HBV**
  - severe acute disease
  - low risk of chronic infection
- **Superinfection on top of chronic HBV**
  - usually develop chronic HDV infection
  - high risk of severe chronic liver disease

Modes of transmission:

1) Percutanous exposures eg, injecting drug use
2) Permucosal exposures eg, sex contact

Hepatitis D - Prevention

- HBV-HDV Coinfection
  - Pre or postexposure prophylaxis to prevent HBV infection (HBIG and/or Hepatitis B vaccine)
- HBV-HDV Superinfection
  - Education to reduce risk behaviors among persons with chronic HBV infection

Hepatitis E - Clinical Features

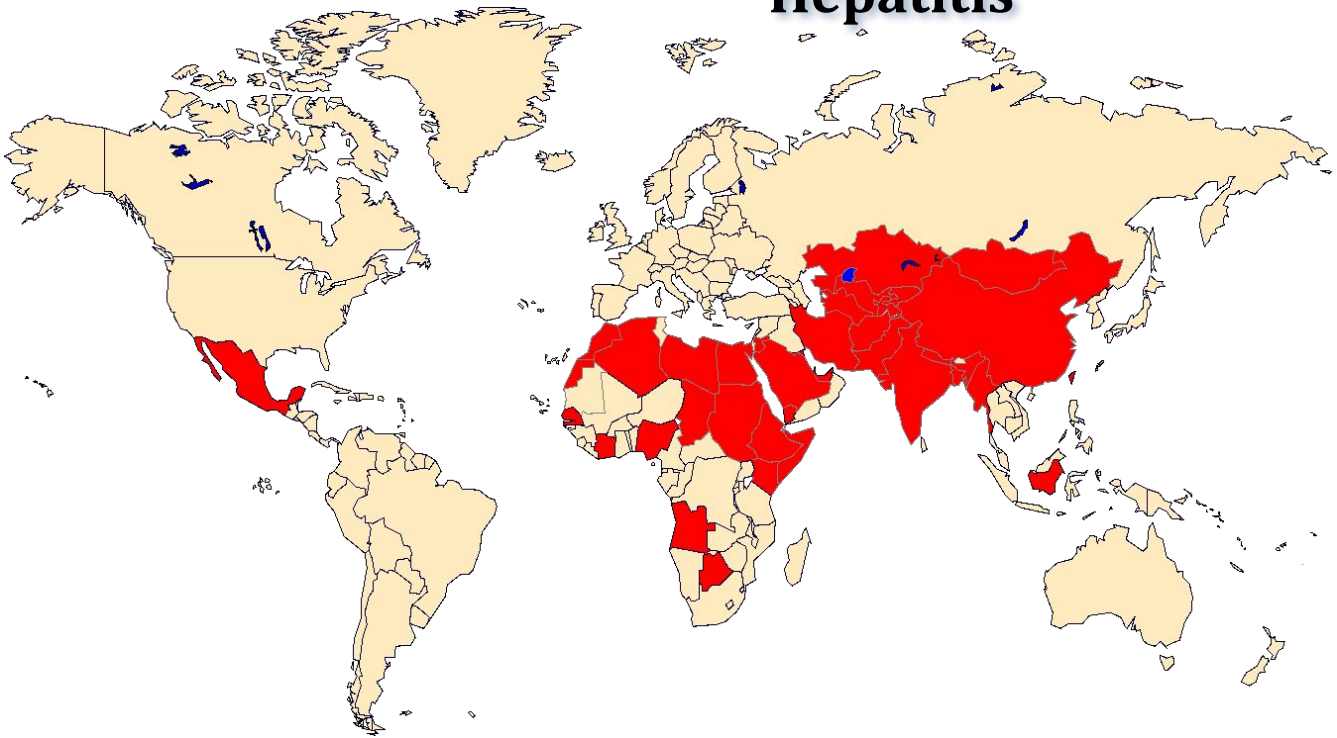
- Incubation period: Average 40 days
  - Range 15-60 days
- Case-fatality rate: Overall, 1%-3%
  Pregnant women, 15%-25%
- Illness severity: Increased with age
- Chronic sequelae: None identified

Epidemiologic factors:

- Most outbreaks associated with fecally contaminated drinking water
- Minimal person-to-person transmission

Geographic Distribution of Hepatitis E

Outbreaks or Confirmed Infection in >25% of Sporadic Non-ABC Hepatitis



Summary

Viral Hepatitis - Overview

	Type of Hepatitis				
	A	B	C	D	E
Source of virus	feces	blood/ blood-derived body fluids	blood/ blood-derived body fluids	blood/ blood-derived body fluids	feces
Route of transmission	fecal-oral	percutaneous permucosal	percutaneous permucosal	percutaneous permucosal	fecal-oral
Chronic infection	no	yes	yes	yes	no
Prevention	pre/post-exposure immunization	pre/post-exposure immunization	blood donor screening; risk behavior modification	pre/post-exposure immunization; risk behavior modification	ensure safe drinking water