Hepatitis A-E Viruses

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Outline:

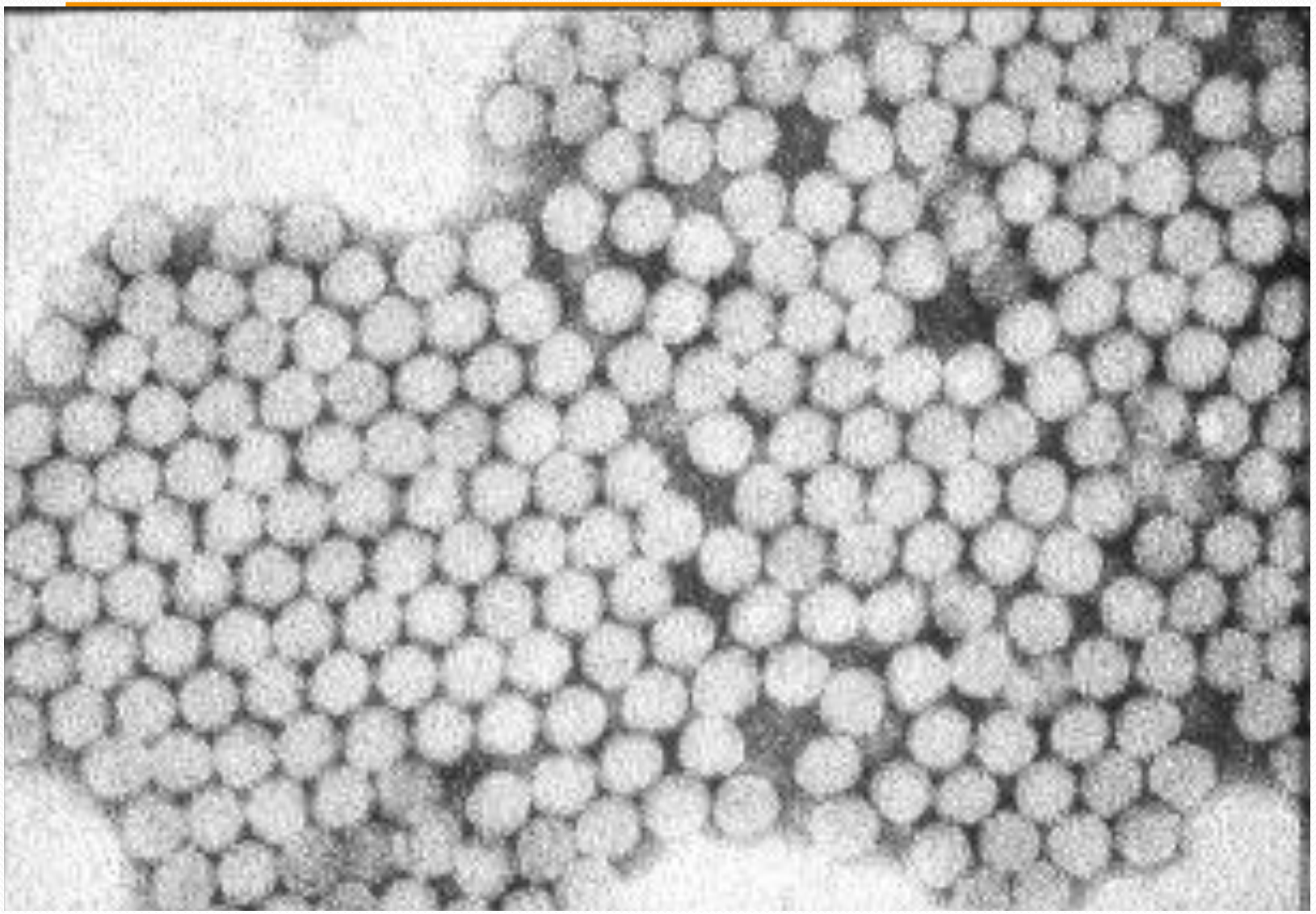
- Define Hepatitis A-E Viruses.
- Discus Pathophysiology of them.
- Identify diagnostic test related to them.
- Treatment.
- Complications.
- Nursing Assessment, Dignosis, and Intervention.

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

Hepatitis A Virus

Hepatitis A Virus



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Hepatitis A Virus

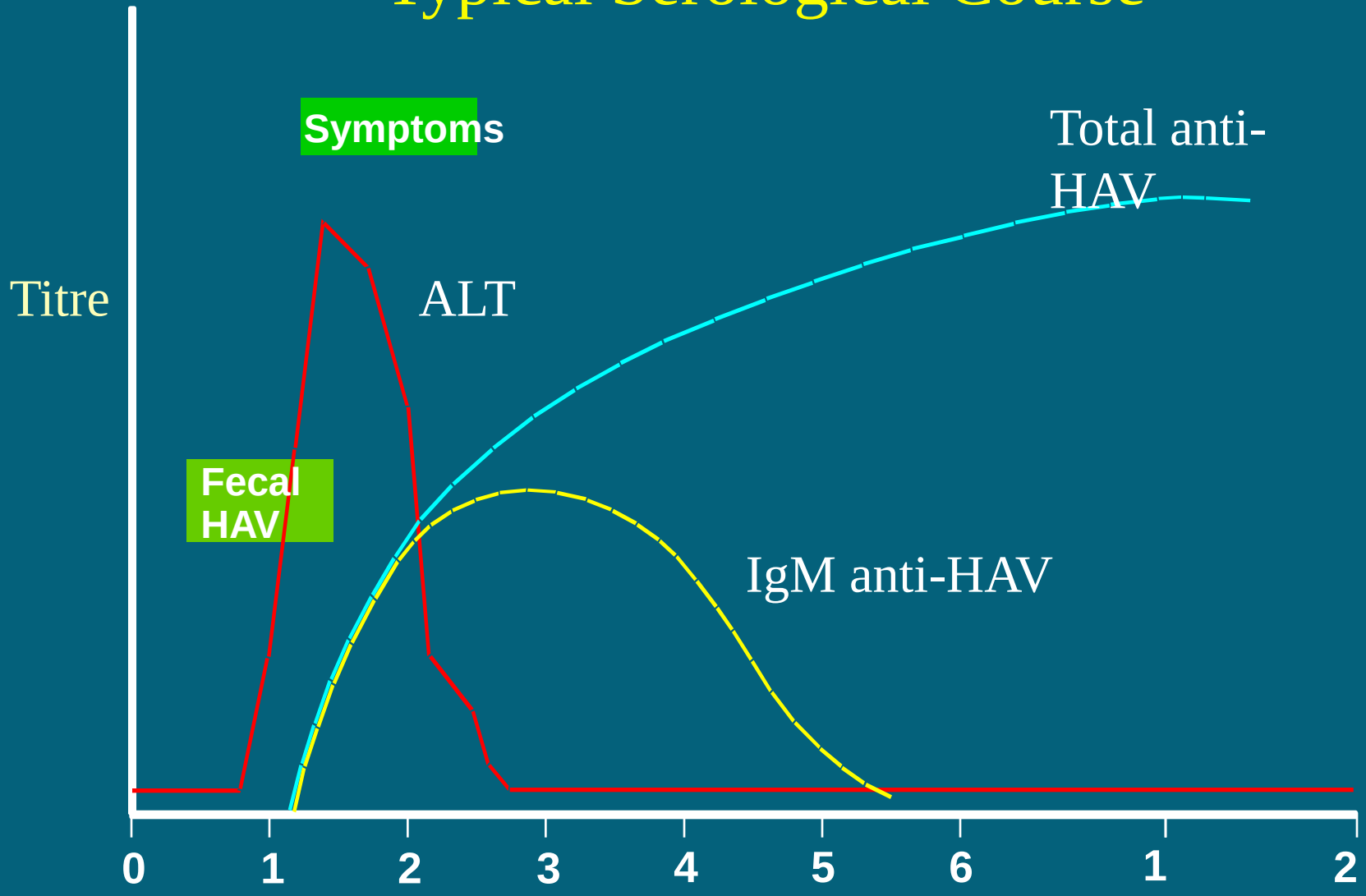
- It is ribonucleic acid (RNA) virus.
- Related to enteroviruses, formerly known as enterovirus 72.
- One stable serotype only.
- Difficult to grow in cell culture.
- 4 genotypes exist, but in practice most of them are group 1.
- Mortality is 0% to 1%, with recovery as the rule.

Hepatitis A - Clinical Features

- **Incubation period:** **Average** 30 days
  Range 15-50 days.
- **Jaundice by age group:** **<6 yrs,** <10%
  6-14 yrs, 40%-50%
  >14 yrs, 70%-80%.
- **Complications:** Fulminant hepatitis
  Cholestatic hepatitis
  Relapsing hepatitis.
- **Chronic sequelae:** **None**

Hepatitis A Infection

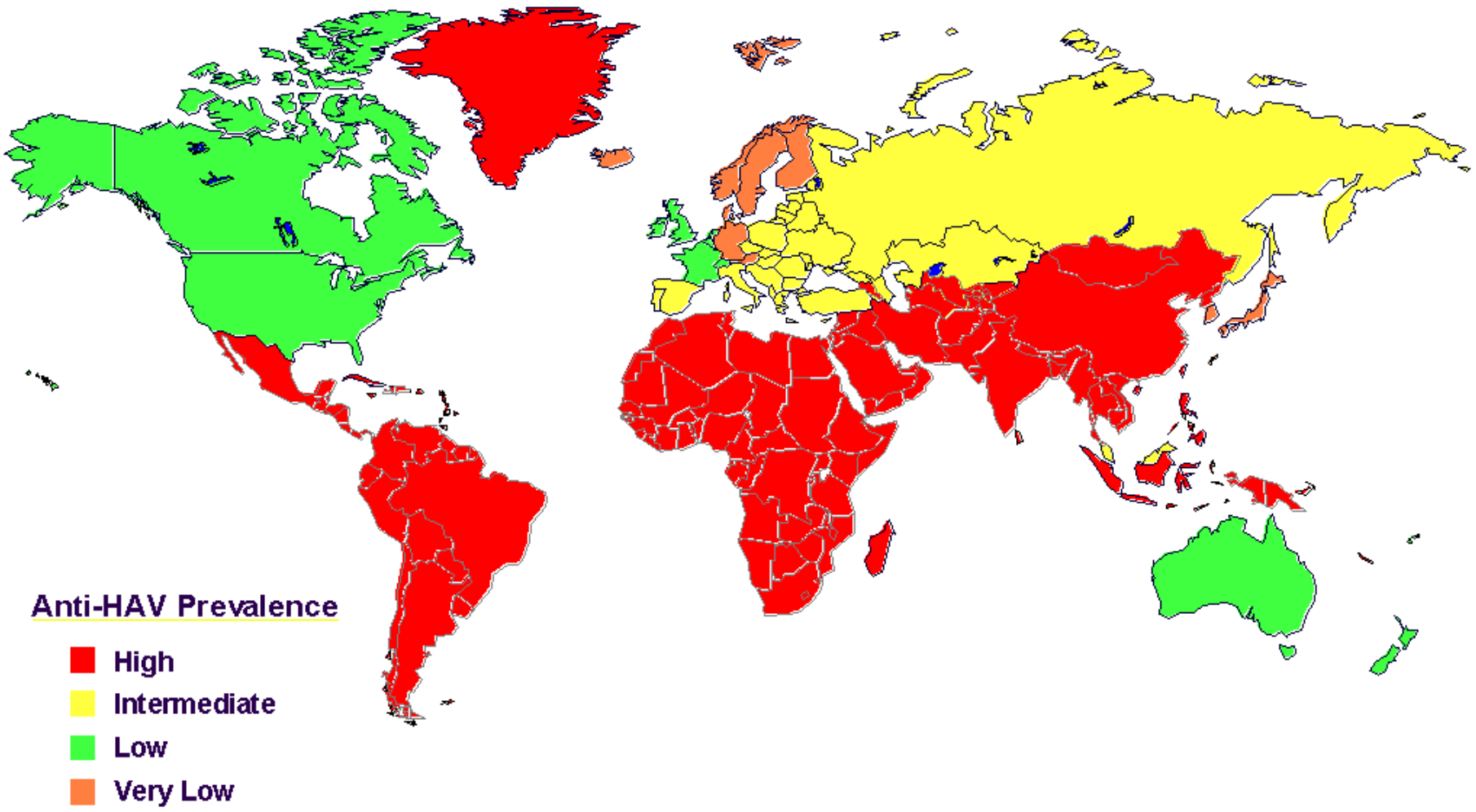
Typical Serological Course



Hepatitis A Virus Transmission

- Close personal contact (commonly):
  (e.g., household contact, sex contact, child day care centers)
- Contaminated food, water (usually):
  (e.g., infected food handlers, raw shellfish)
- Blood exposure (rare):
  (e.g., injecting drug use, transfusion)

Geographic Distribution of HAV Infection



Global Patterns of Hepatitis A Virus Transmission

Endemicity	Disease Rate	Peak Age of Infection	Transmission Patterns
High	Low to High	Early childhood	Person to person; outbreaks uncommon
Moderate	High	Late childhood/ young adults	Person to person; food and waterborne outbreaks
Low	Low	Young adults	Person to person; food and waterborne outbreaks
Very low	Very low	Adults	Travelers; outbreaks uncommon

Laboratory Diagnosis

- **Acute infection** is diagnosed by the detection of HAV-IgM in serum
- **Past Infection** i.e. immunity is determined by the detection of HAV-IgG
- **Cell culture** – difficult and take up to 4 weeks, not routinely performed
- **Direct Detection** – EM, RT-PCR of faeces. Can detect illness earlier than serology but rarely performed.

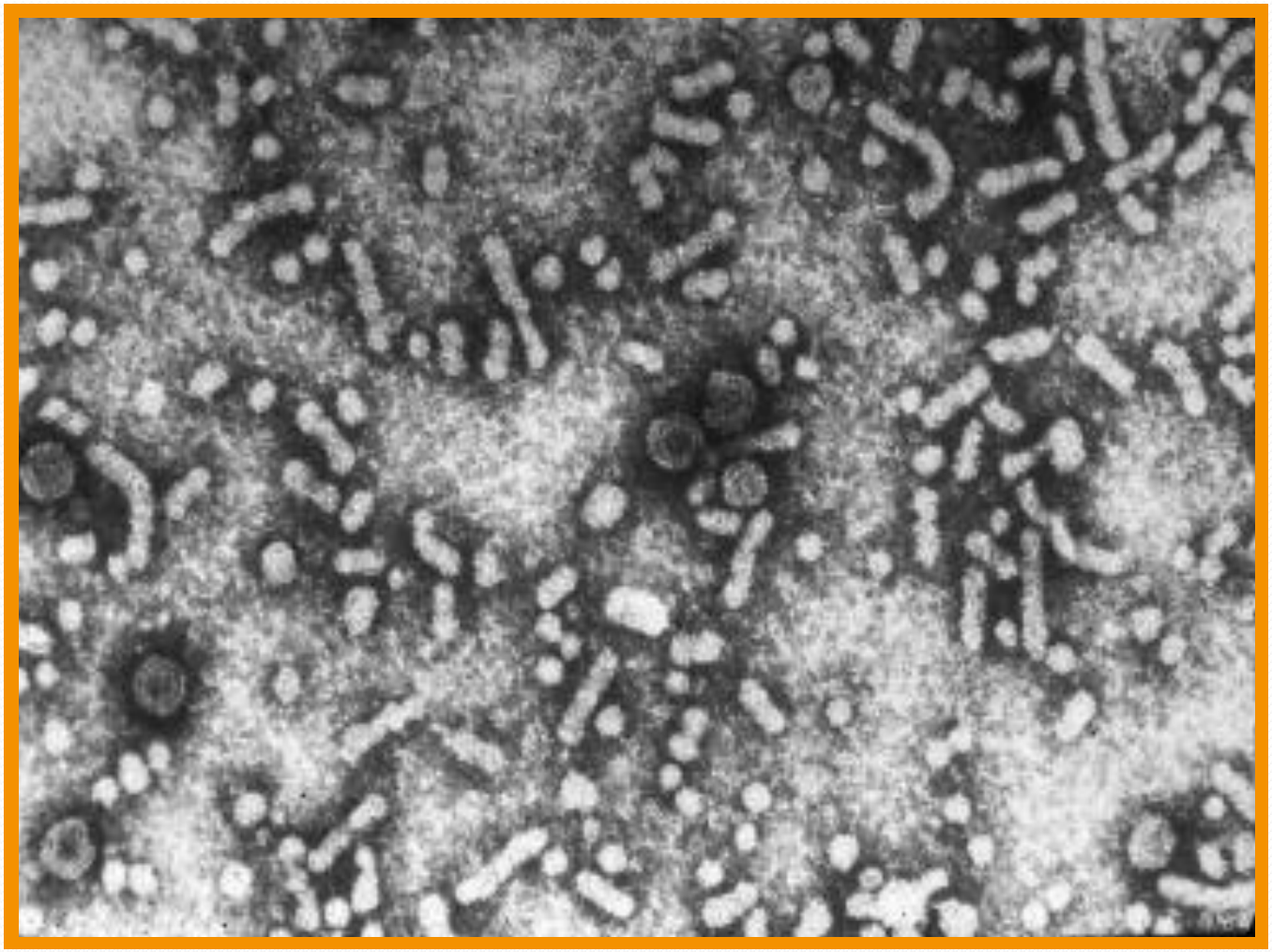
Hepatitis A Vaccination Strategies Epidemiologic Considerations

- **2 doses in children after 1 year of age**
- **Many cases occur in community-wide outbreaks**
  - no risk factor identified for most cases
  - highest attack rates in 5-14 year olds
  - children serve as reservoir of infection
- **Persons at increased risk of infection**
  - travelers
  - homosexual men
  - injecting drug users

Hepatitis A Prevention - Immune Globulin

- **Pre-exposure**
  - travelers to intermediate and high HAV-endemic regions
- **Post-exposure (within 14 days)**
  - ✓ **Routine**
  - household and other intimate contacts
  - ✓ **Selected situations**
  - institutions (e.g., day care centers)
  - common source exposure (e.g., food prepared by infected food handler)

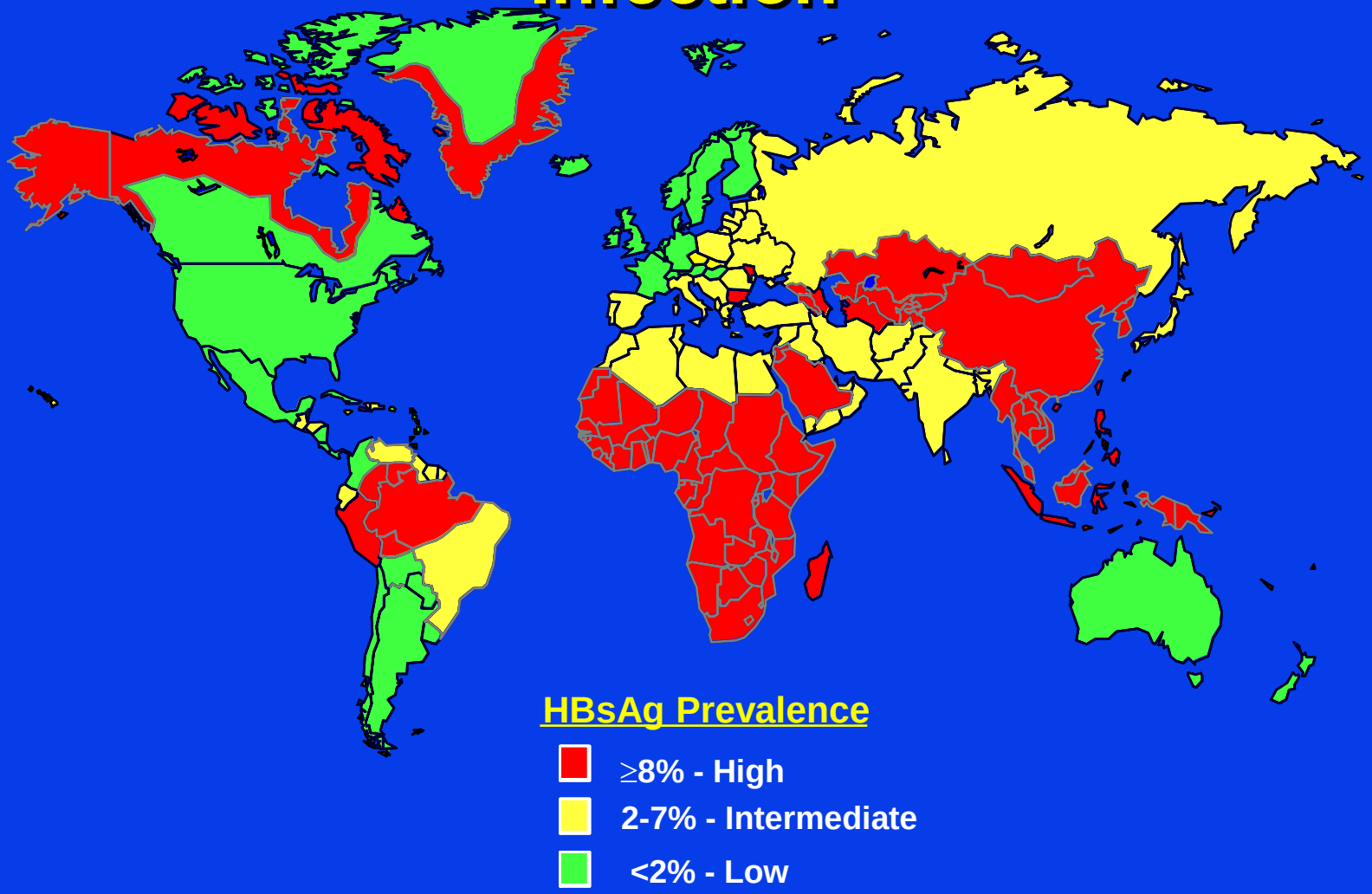
Hepatitis B Virus



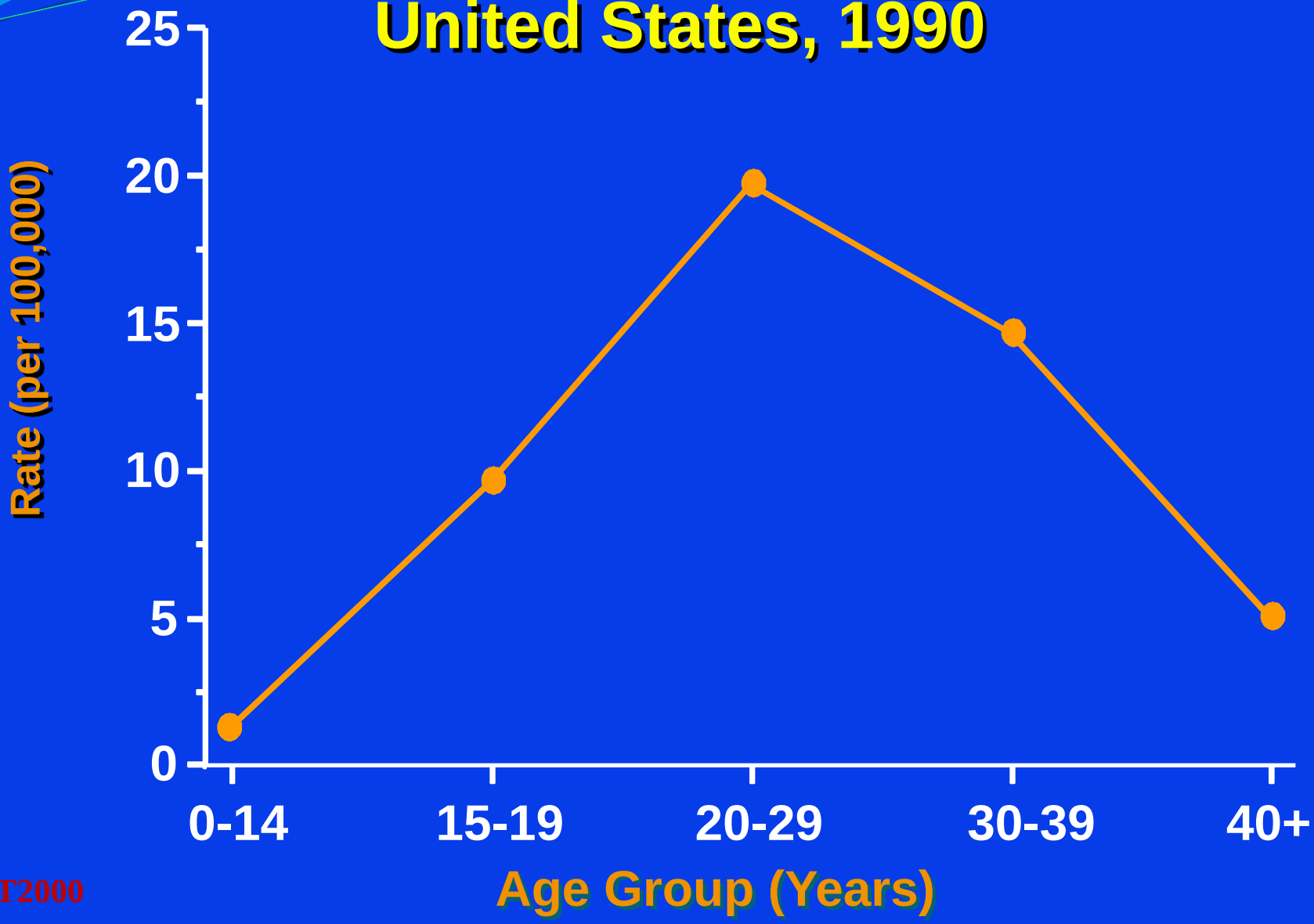
Hepatitis B Virus - Virology

- Hepatitis B (HBV) is a double-shelled particle containing DNA.
- The HBcAg is of a single serotype.
- Hepatitis B virus (HBV) has 8 genotypes (A-H).

Geographic Distribution of Chronic HBV Infection



Rate of Reported Hepatitis B by Age Group United States, 1990



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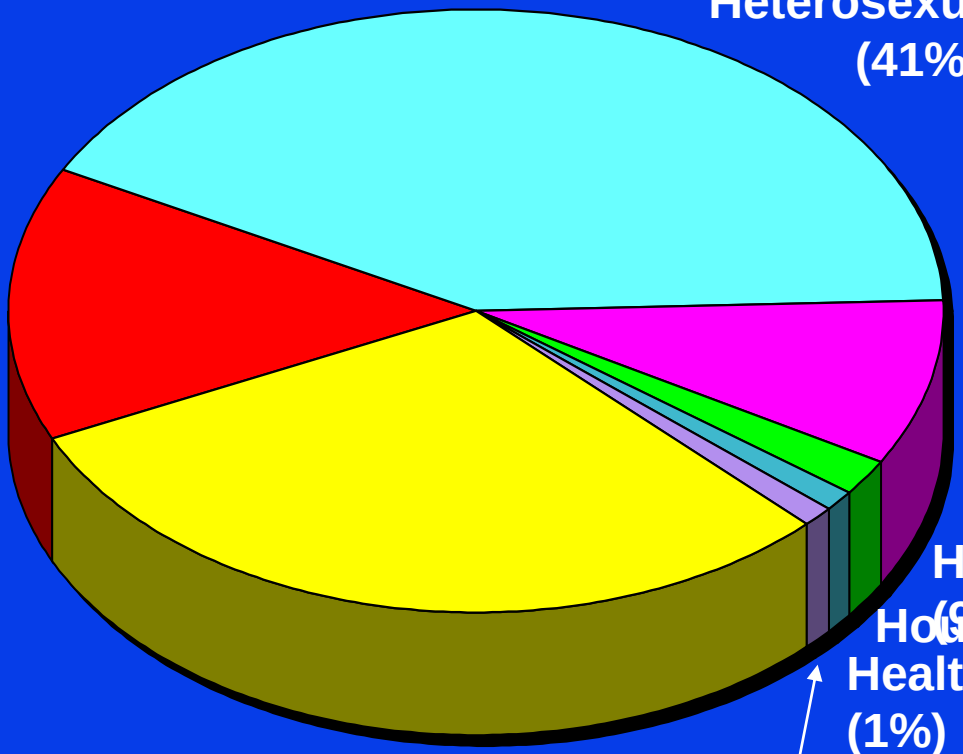
Source: CDC Viral Hepatitis Surveillance Program

Risk Factors for Acute Hepatitis B
United States, 1992-1993



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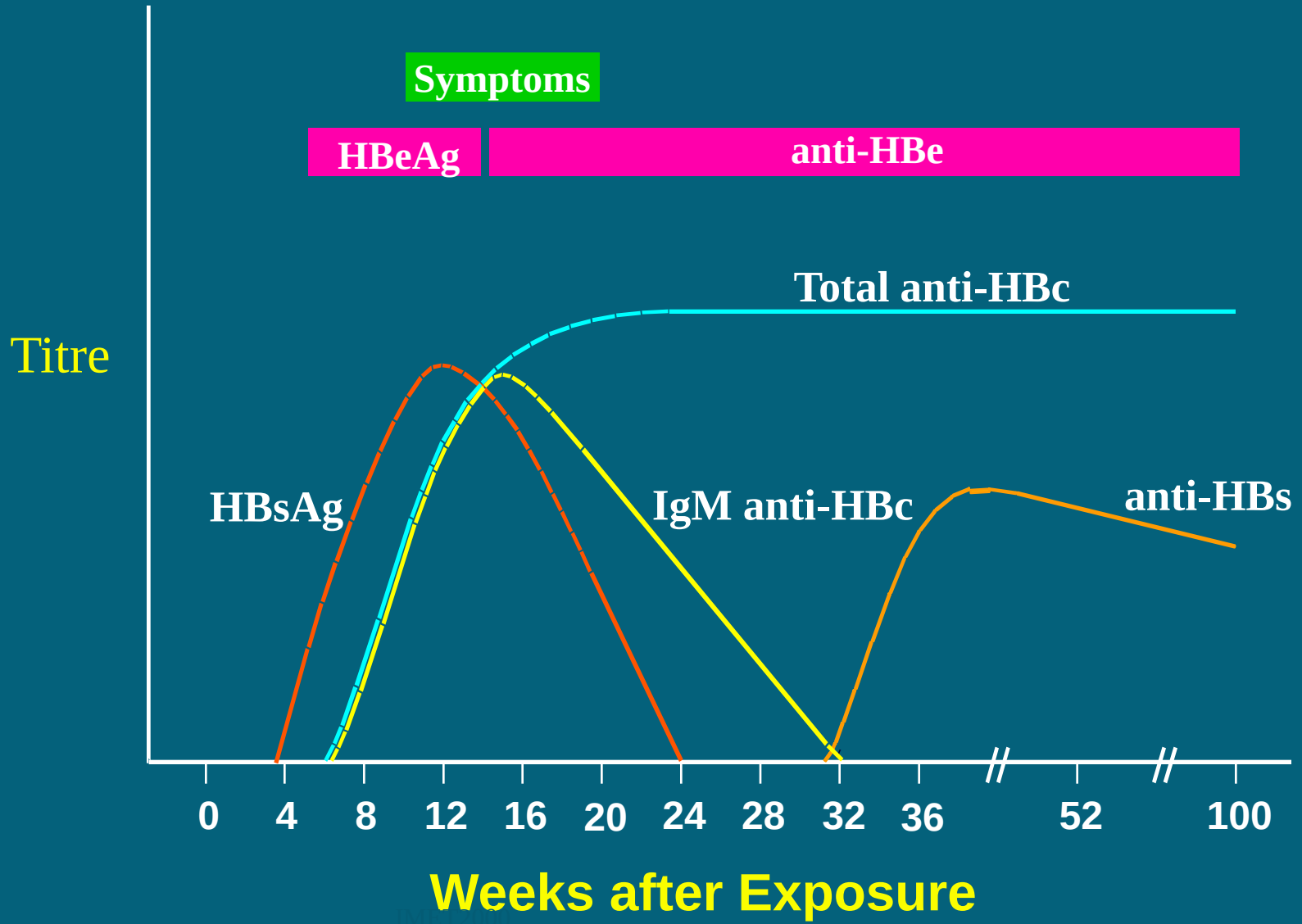
* Includes sexual contact with acute cases, carriers, and multiple partners.
Source: CDC Sentinel Counties Study of Viral Hepatitis

Hepatitis B - Clinical Features

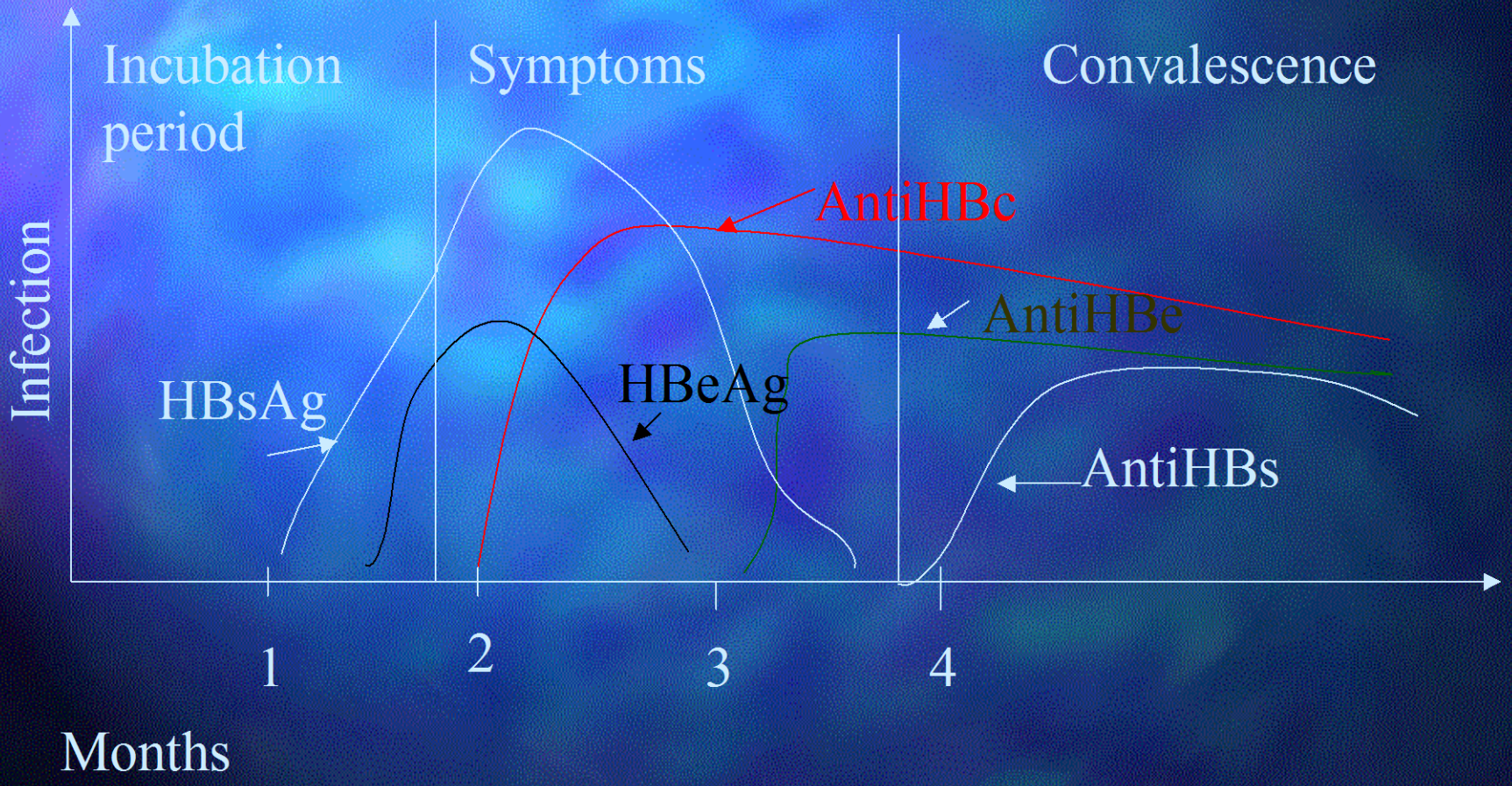
▪ Incubation period:	Average 60-90 days Range 45-180 days
▪ Clinical illness (jaundice):	<5 yrs, <10% 5 yrs, 30%-50%
▪ Acute case-fatality rate:	0.5%-1%
▪ Chronic infection:	<5 yrs, 30%-90% 5 yrs, 2%-10%
▪ Premature mortality from chronic liver disease:	15%-25%

Acute Hepatitis B Virus Infection with Recovery

Typical Serologic Course



ANTIGENS AND IMMUNOLOGY



OUTCOME OF HEPATITIS B INFECTION

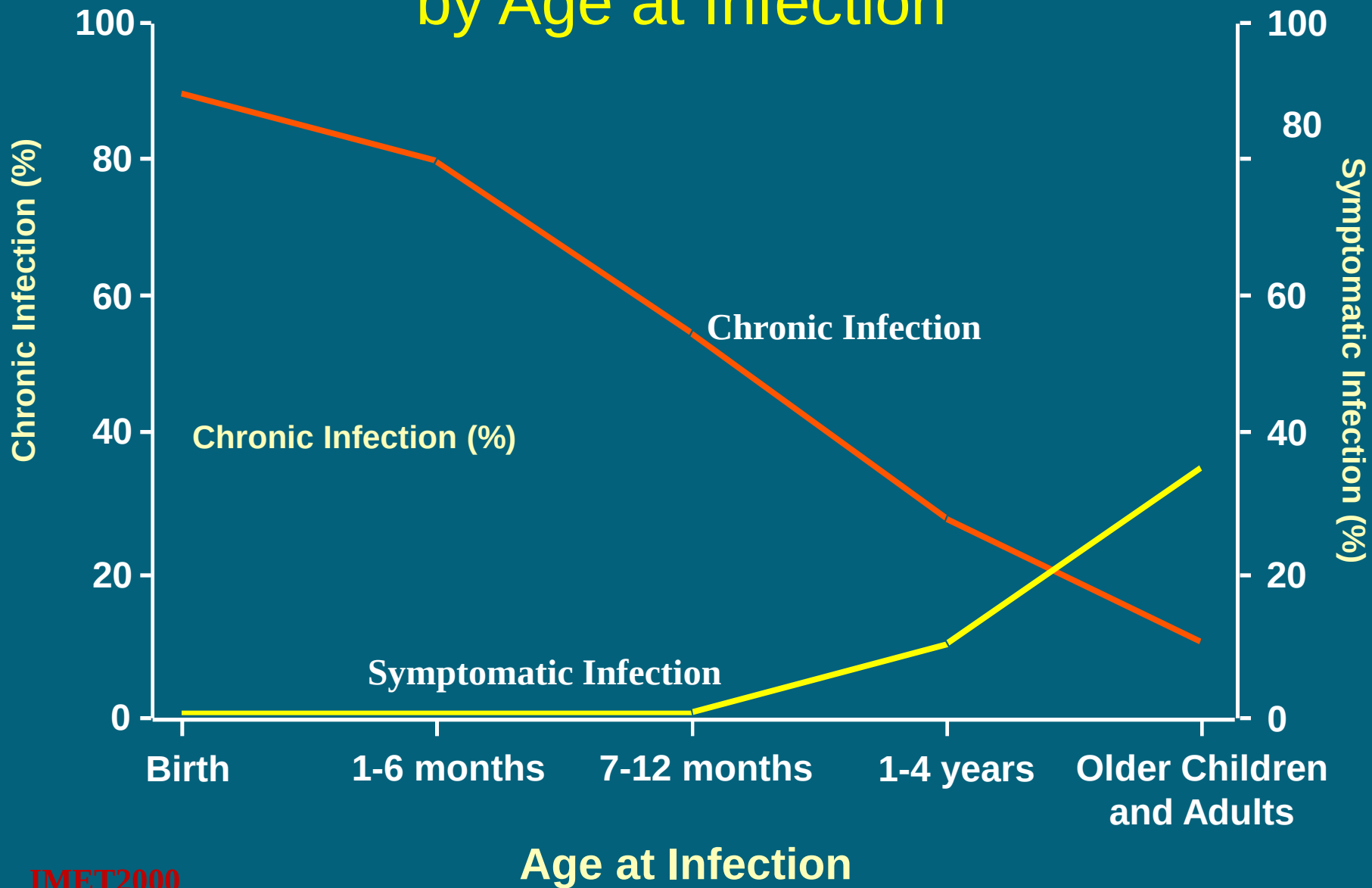
- 90% Complete Recovery
- 10% Variable Course

- Who is more likely to develop chronic hepatitis?
  - Likelihood varies as function of age:
    - Infection acquired at birth--->silent acute infection-->90% chronic infection.
    - Infection acquired in young adulthood-->Acute hepatitis-->1% risk chronicity.

Spectrum of Chronic Hepatitis B Diseases

1. Chronic Persistent Hepatitis – asymptomatic.
2. Chronic Active Hepatitis - symptomatic exacerbations of hepatitis.
3. Cirrhosis of Liver.
4. Hepatocellular Carcinoma.

Outcome of Hepatitis B Virus Infection by Age at Infection



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Global Patterns of Chronic HBV Infection:

- **High (>8%): 45% of global population:**
  - lifetime risk of infection >60%
  - early childhood infections common
- **Intermediate (2%-7%): 43% of global population:**
  - lifetime risk of infection 20%-60%
  - infections occur in all age groups
- **Low (<2%): 12% of global population:**
  - lifetime risk of infection <20%
  - most infections occur in adult risk groups

Cont'd Chronic hepatitis B

- 2 Phases by serological markers:
  - (1) Replicative phase:
    - HBeAg⊕; HBV DNA⊕; HBCAg⊕
  - (2) Nonreplicative phase
    - :HBeAg∅; HBV DNA∅; Anti-HBe ⊕; HBcAg ∅

Concentration of Hepatitis B Virus in Various Body Fluids:

High	Moderate	Low/Not Detectable
blood	semen	urine
serum	vaginal fluid	feces
wound exudates	saliva	sweat
		tears
		breastmilk

Hepatitis B Virus Modes of Transmission:

- Sexual - sex workers and homosexuals are particular at risk.
- Parenteral – IV Drug Addicts, Health Workers are at increased risk.
- Perinatal - Mothers who are HBeAg positive are much more likely to transmit to their offspring than those who are not. Perinatal transmission is the main means of transmission in high prevalence populations.

Diagnosis

- A battery of serological tests are used for the diagnosis of acute and chronic hepatitis B infection.
- **HBsAg:** used as a general marker of infection.
- **HBsAb:** used to document recovery and/or immunity to HBV
- **anti-HBc IgM:** marker of acute infection.
- anti-HBcIgG: past or chronic infection.
- **HBeAg:** active replication of virus and therefore infectiveness.
- Anti-Hbe: virus no longer replicating. (patient can still be positive for HBsAg).
- **HBV-DNA:** indicates active replication of virus, more accurate than HBeAg especially in cases of escape mutants. Used mainly for monitoring response to therapy.

DIAGNOSIS

- ACUTE HEPATITIS B:
  - IgM Anti-HBc +/- HBsAg
- CHRONIC HEPATITIS B:
  - HBsAg (+)
  - IgM Anti-HBc (-)
  - IgG Anti HBc (+)

Treatment

- **Interferon** - for HBeAg +ve carriers with chronic active hepatitis. Response rate is 30 to 40%.
  - alpha-interferon 2b (original)
  - alpha-interferon 2a (newer, claims to be more efficacious and efficient)
- **Lamivudine** - a nucleoside analogue reverse transcriptase inhibitor. Well tolerated, most patients will respond favorably. However, tendency to relapse on cessation of treatment. Another problem is the rapid emergence of drug resistance.
- **Adefovir –** less likely to develop resistance than Lamivudine and may be used to treat Lamivudine resistance HBV. However more expensive and toxic
- **Entecavir –** most powerful antiviral known, similar to Adefovir.
- Liver Transplant for end stage hepatitis B.

Prevention

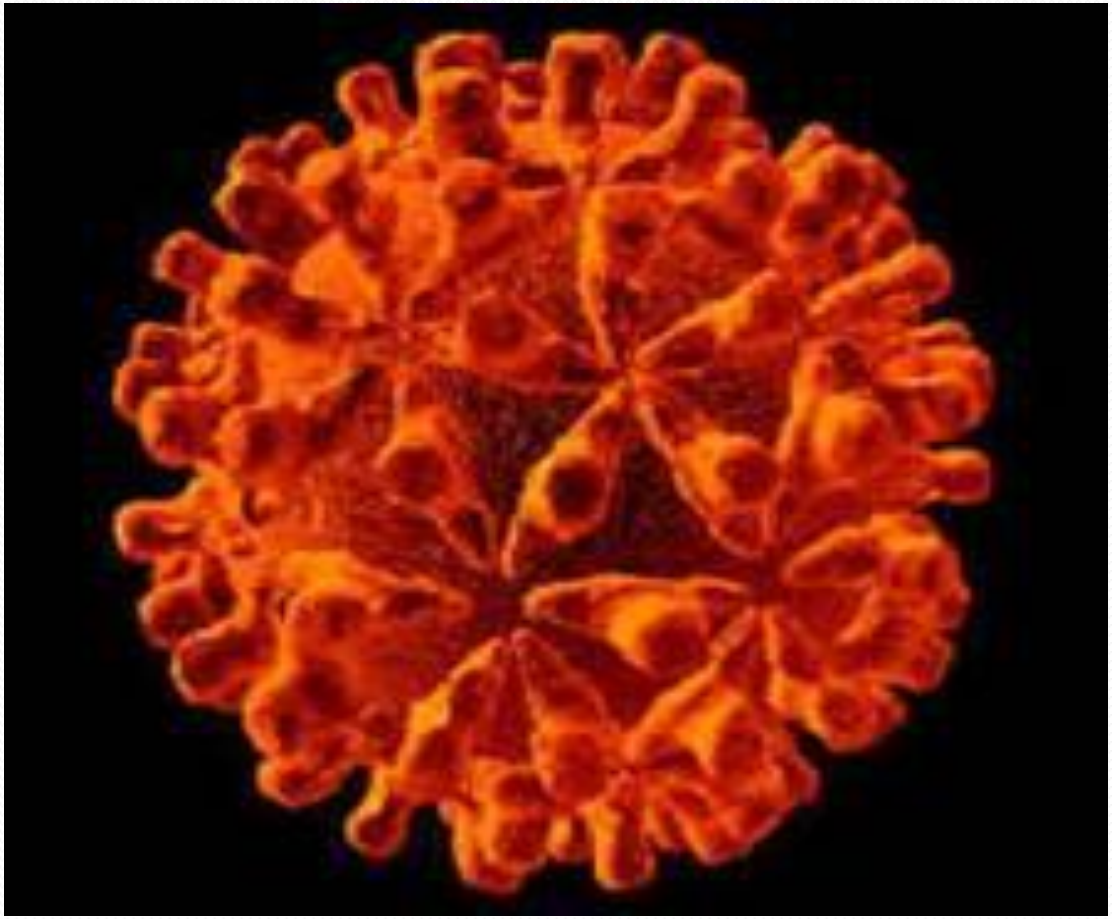
1. **Vaccination:** highly effective recombinant vaccines are now available. Vaccine can be given to those who are at increased risk of HBV infection such as health care workers. It is also given routinely to neonates as universal vaccination in many countries.
2. **Hepatitis B Immunoglobulin:** HBIG may be used to protect persons who are exposed to hepatitis B. It is particular efficacious within 48 hours of the incident. It may also be given to neonates who are at increased risk of contracting hepatitis B i.e. whose mothers are HBsAg and HBeAg positive.
3. **Other measures:** screening of blood donors, blood and body fluid precautions.

Elimination of Hepatitis B Virus Transmission United States

Strategy

- Prevent perinatal HBV transmission
- Routine vaccination of all infants
- Vaccination of children in high-risk groups
- Vaccination of adolescents
  - all unvaccinated children at 11-12 years of age
  - "high-risk" adolescents at all ages
- Vaccination of adults in high-risk groups

Hepatitis C Virus



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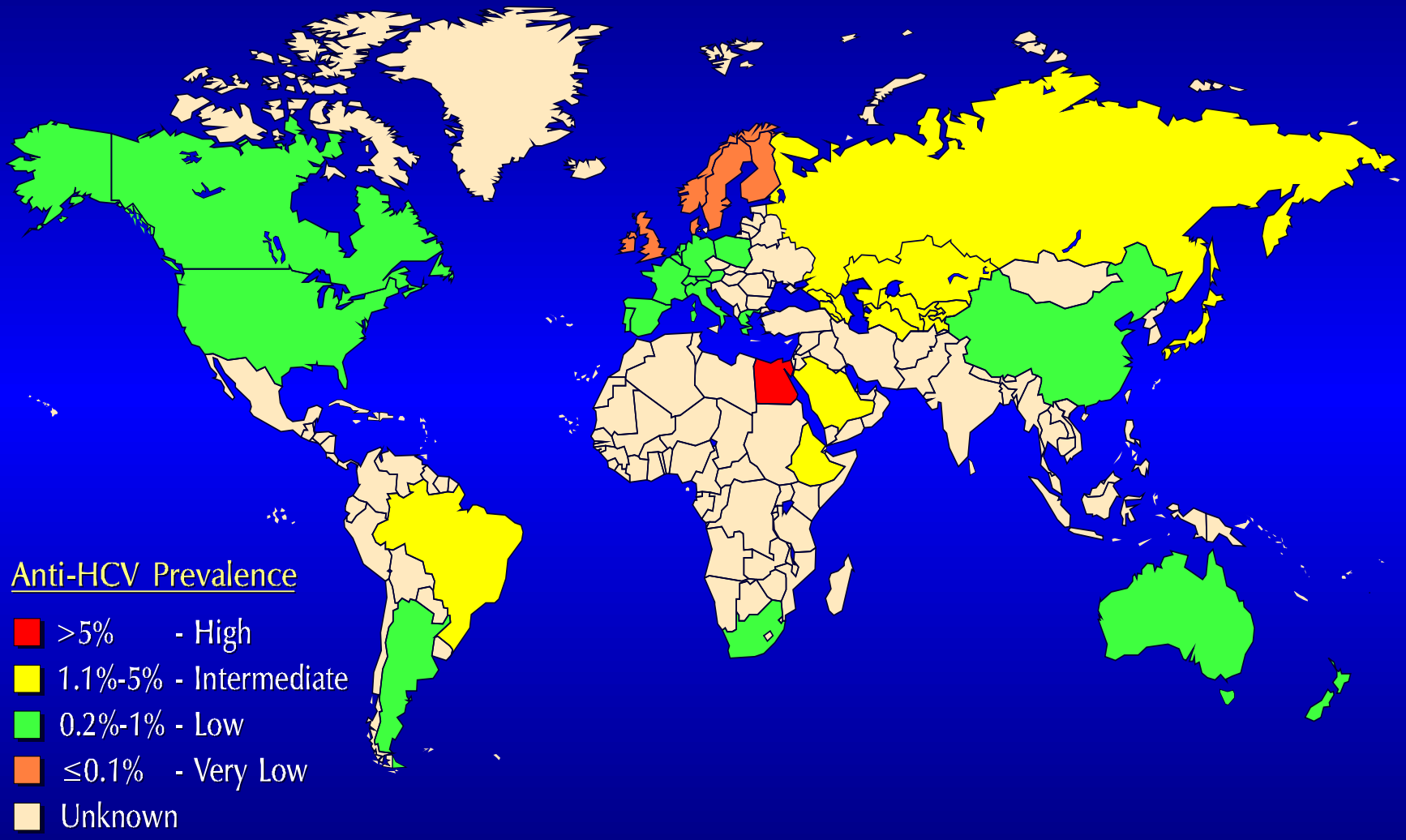
Hepatitis C Virus

- Genome resembled that of a flavivirus positive stranded RNA genome of around 10,000 bases
- Morphological structure remains unknown
- HCV has been classified into a total of six genotypes (type 1 to 6).
- Genotype 1 and 4 has a poorer prognosis and response to interferon therapy,

Prevalence of HCV Infection Among Blood Donors*



* Anti-HCV prevalence by EIA-1 or EIA-2 with supplemental testing; based on data available in January, 1995.

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Hepatitis C - Clinical Features

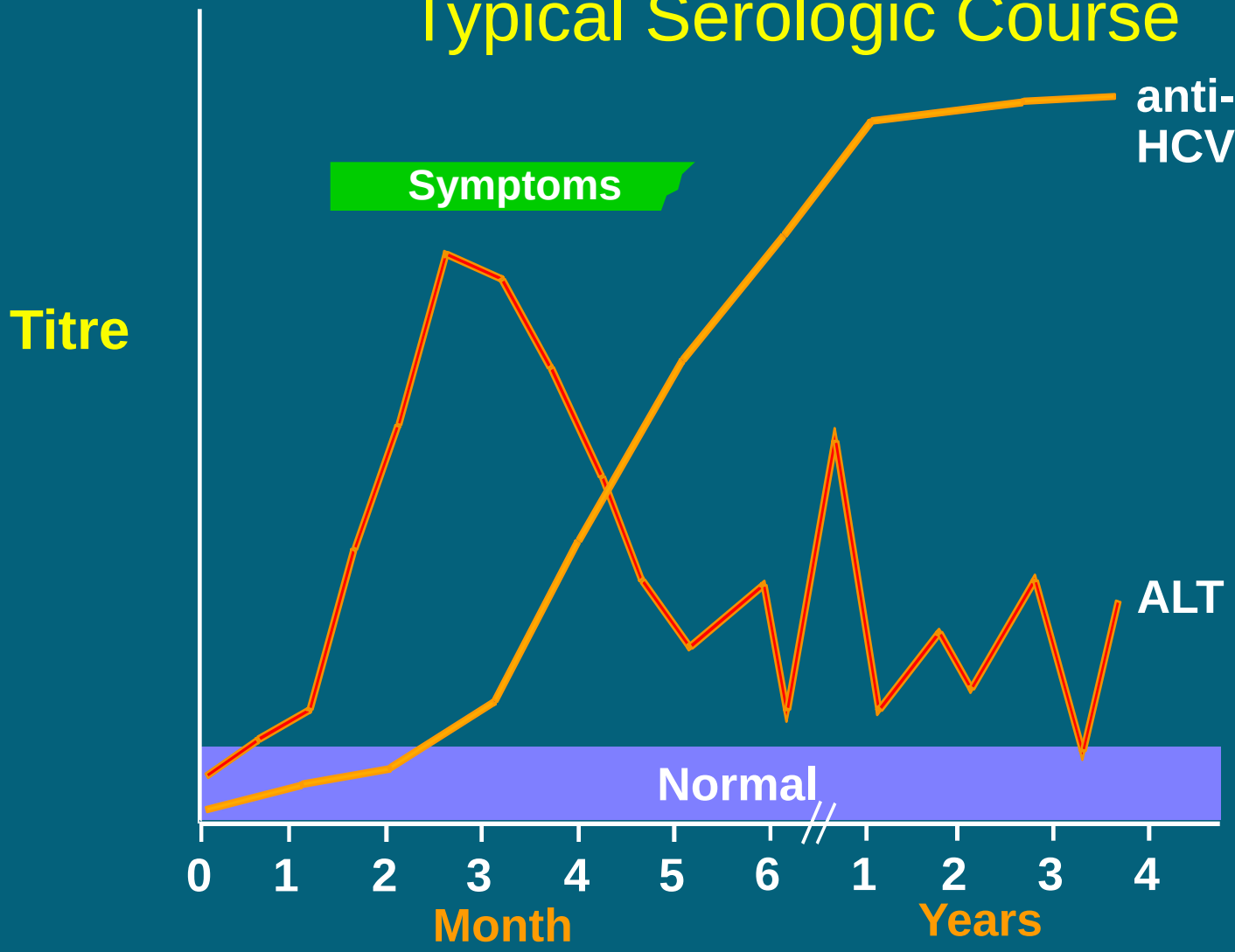
Incubation period:	Average 6-7 wks Range 2-26 wks
Clinical illness (jaundice):	30-40% (20-30%)
Chronic hepatitis:	70%
Persistent infection:	85-100%
Immunity:	No protective antibody response identified

Chronic Hepatitis C Infection

- The spectrum of chronic hepatitis C infection is essentially the same as chronic hepatitis B infection.
- All the manifestations of chronic hepatitis B infection may be seen, albeit with a lower frequency i.e. chronic persistent hepatitis, chronic active hepatitis, cirrhosis, and hepatocellular carcinoma.

Hepatitis C Virus Infection

Typical Serologic Course



Risk Factors Associated with Transmission of HCV

- Transfusion or transplant from infected donor.
- Injecting drug use.
- Hemodialysis (yrs on treatment).
- Accidental injuries with needles/sharps.
- Sexual/household exposure to anti-HCV-positive contact.
- Multiple sex partners.
- Birth to HCV-infected mother.

Laboratory Diagnosis

- ***HCV antibody***: generally used to diagnose hepatitis C infection. Not useful in the acute phase as it takes at least 4 weeks after infection before antibody appears.
- **HCV-RNA**: various techniques are available e.g. PCR and branched DNA. May be used to diagnose HCV infection in the acute phase. However, its main use is in monitoring the response to antiviral therapy.
- **HCV-antigen**: an EIA for HCV antigen is available. It is used in the same capacity as HCV-RNA tests but is much easier to carry out.

Prognostic Tests

- Genotyping – genotype 1 and 4 have a worse prognosis overall and respond poorly to interferon therapy
- Viral Load – patients with high viral load are thought to have a poorer prognosis.

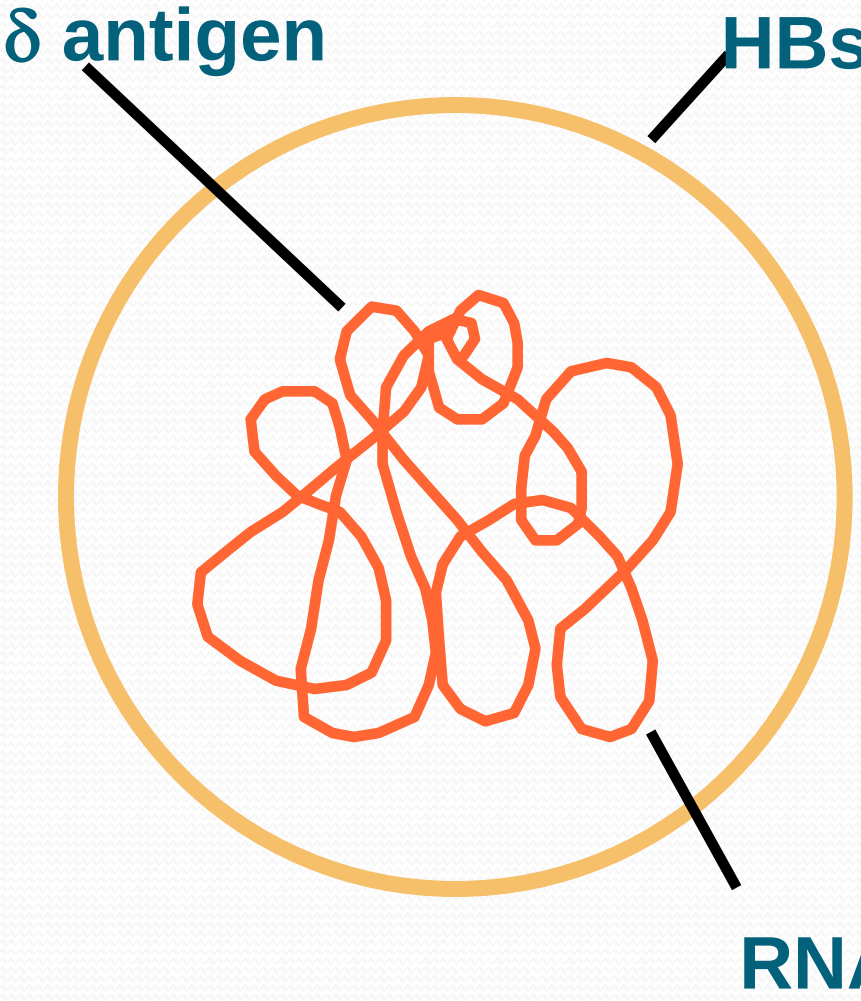
Treatment

- Interferon - may be considered for patients with chronic active hepatitis. The response rate is around 50% but 50% of responders will relapse upon withdrawal of treatment.
- Ribavirin - there is less experience with ribavirin than interferon. However, recent studies suggest that a combination of interferon and ribavirin is more effective than interferon alone.

Prevention of Hepatitis C

- Screening of blood, organ, tissue donors.
- High-risk behavior modification.
- Blood and body fluid precautions.

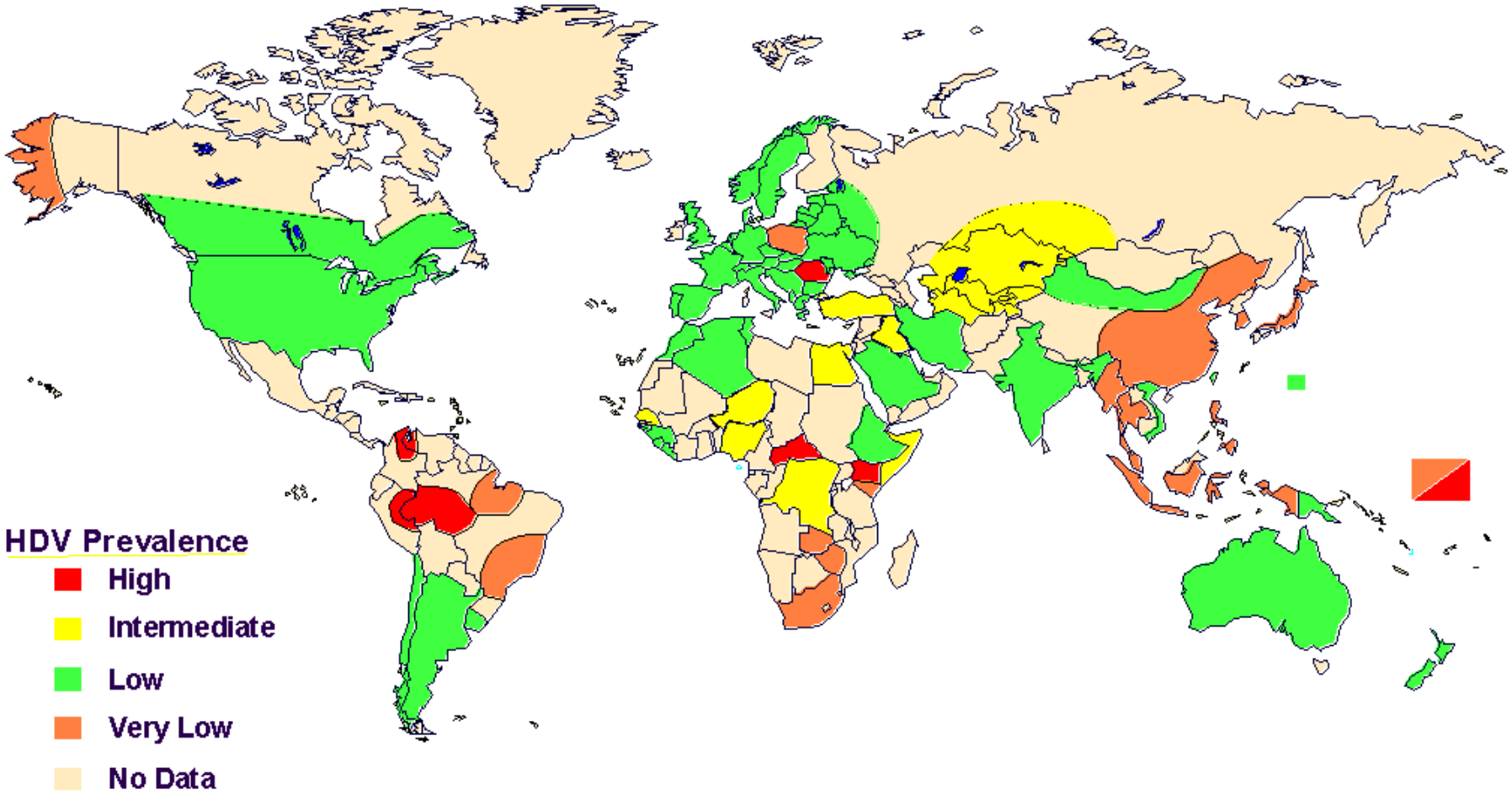
Hepatitis D (Delta) Virus



Hepatitis D Virus

- The delta agent is a defective virus which shows similarities with the viroids in plants.
- The genome of the virus is very small and consists of a single-stranded RNA

Geographic Distribution of HDV Infection



Hepatitis D - Clinical Features:

- **Coinfection with HBV:**
  - severe acute disease.
  - low risk of chronic infection.
- **Superinfection with HBV:**
  - usually develop chronic HDV infection.
  - high risk of severe chronic liver disease.
  - may present as an acute hepatitis.

Hepatitis D Virus Modes of Transmission:

- Percutaneous exposures:
  - Injecting drug use
- Per mucosal exposures:
  - Sex contact

Hepatitis D – Prevention:

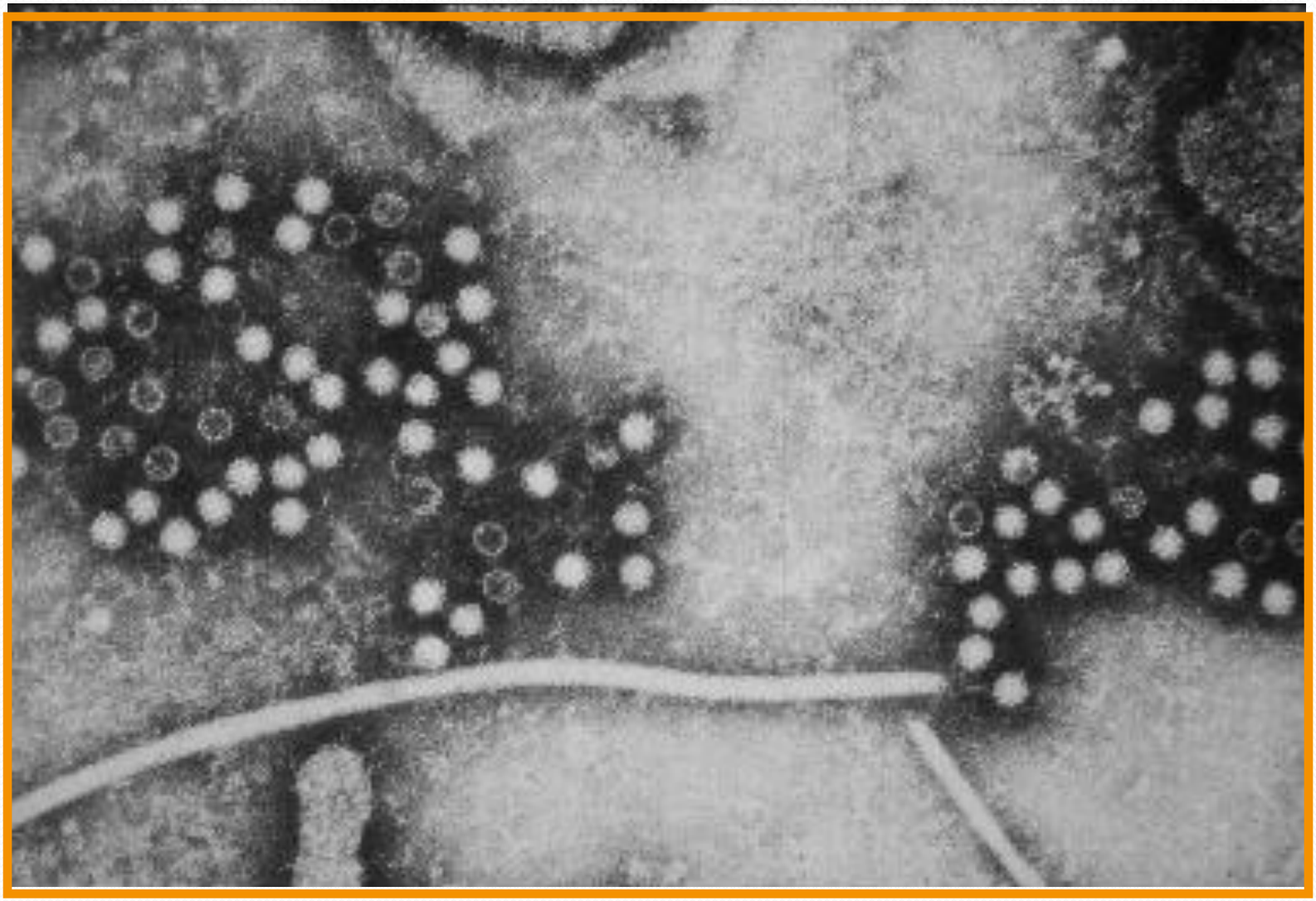
- **HBV-HDV Co-infection:**

  Pre or post exposure prophylaxis to prevent HBV infection.

- **HBV-HDV Super infection:**

  Education to reduce risk behaviors among persons with chronic HBV infection.

Hepatitis E Virus



Hepatitis E Virus

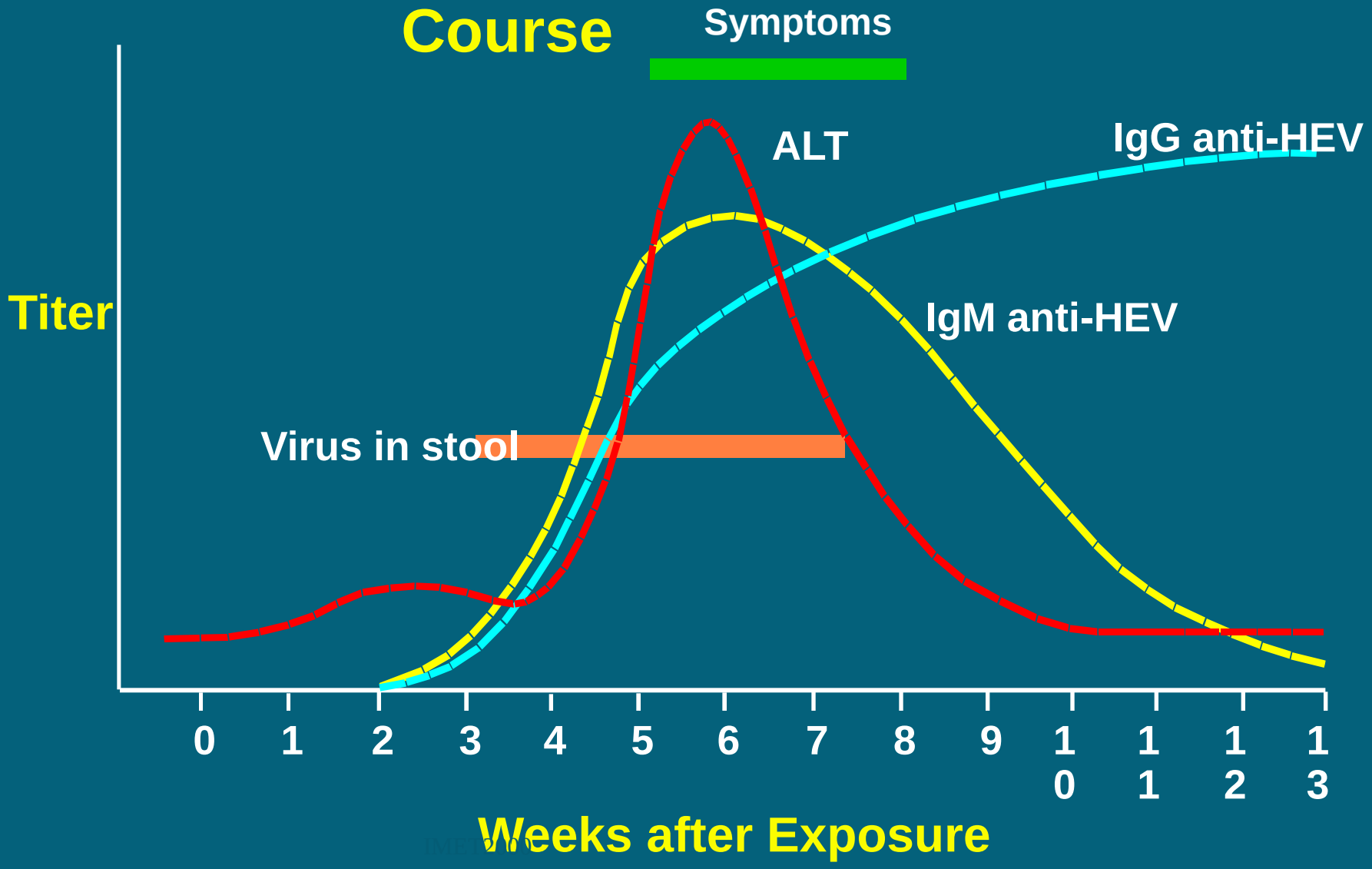
- Calicivirus-like viruses.
- unenveloped RNA virus.
- very labile and sensitive.
- Can only be cultured recently.

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

Hepatitis E Virus Infection

Typical Serologic Course

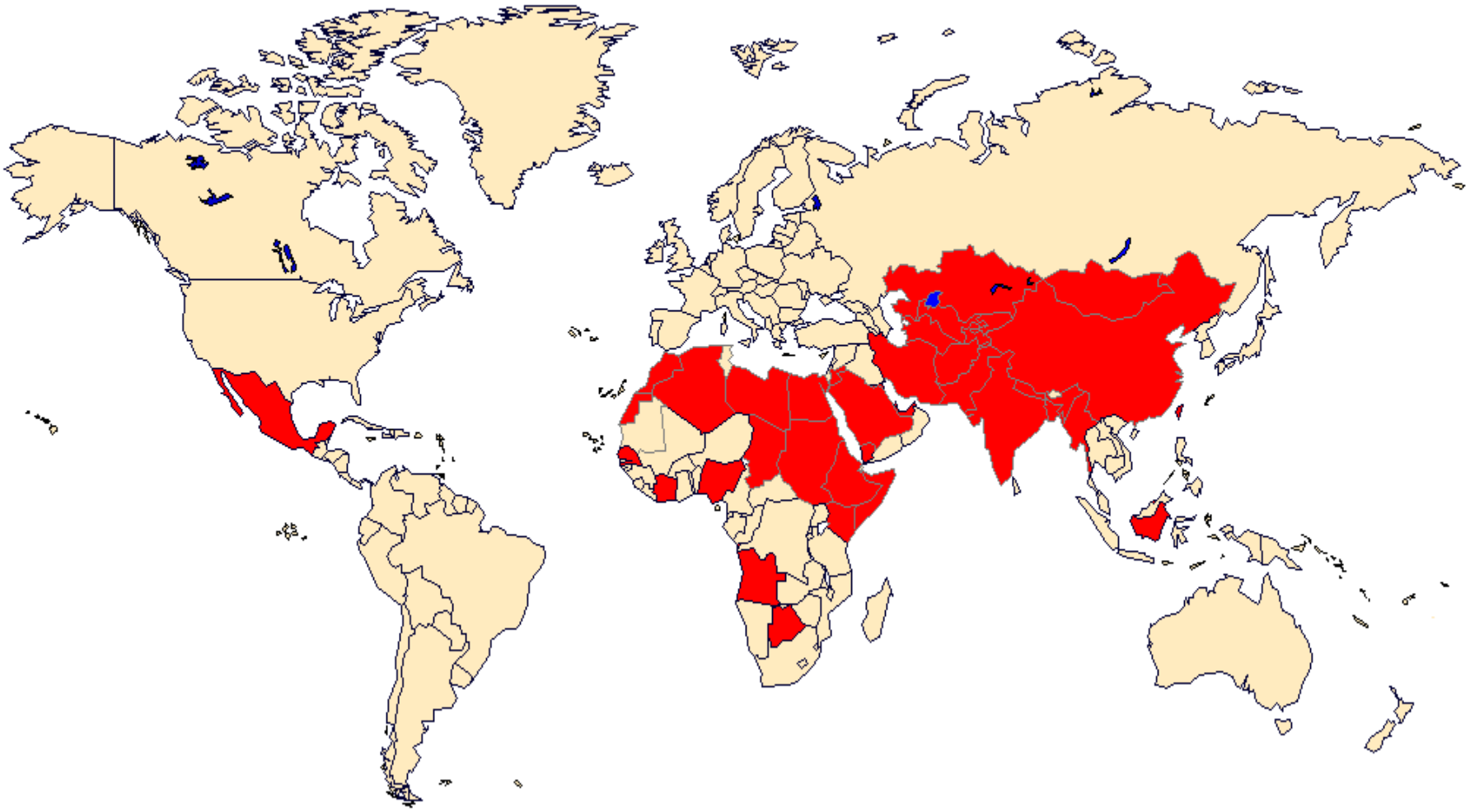


Hepatitis E - Epidemiologic Features

- Most outbreaks associated with faecally contaminated drinking water.
- Several other large epidemics have occurred since in the Indian subcontinent and the USSR, China, Africa and Mexico.
- In the United States and other nonendemic areas, where outbreaks of hepatitis E have not been documented to occur, a low prevalence of anti-HEV (<2%) has been found in healthy populations. The source of infection for these persons is unknown.
- Minimal person-to-person transmission.

Geographic Distribution of Hepatitis E

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



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Prevention and Control Measures for Travelers to HEV-Endemic Regions

- Avoid drinking water (and beverages with ice) of unknown purity, uncooked shellfish, and uncooked fruit/vegetables not peeled or prepared by traveler.
- IG prepared from donors in Western countries does not prevent infection.
- Unknown efficacy of IG prepared from donors in endemic areas.
- Vaccine?

Nursing Assessment:

1. Assess for systemic and liver-related symptoms.
2. Obtain history, such as I.V. drug use, sexual activity, travel, and ingestion of possible contaminated food or water to assess for any mode of transmission of the virus.
3. Assess size and shape of liver to detect enlargement or characteristics of cirrhosis.
4. Obtain vital signs, including temperature.

Nursing Diagnoses (For all patients):

1. Imbalanced Nutrition: Less Than Body Requirements related to effects of liver dysfunction.
2. Deficient Fluid Volume related to nausea and vomiting.
3. Activity Intolerance related to anorexia and liver dysfunction.
4. Deficient Knowledge related to transmission.

Nursing Diagnoses (For HBV patients):

1. Risk for Injury related to coagulopathy because of impaired liver function.
2. Disturbed Thought Processes related to encephalopathy because of impaired liver function.

Nursing Interventions:

Maintaining Adequate Nutrition:

- Encourage frequent small feedings of high-calorie, low-fat diet. Avoid large quantities of protein during acute phase of illness.
- Encourage eating meals in a sitting position to decrease pressure on the liver.
- Encourage taking pleasing meals in an environment with minimal noxious stimuli (odors, noise, interruptions).
- Administer or teach self-administration of antiemetics as prescribed.
- Avoid phenothiazines, such as chlorpromazine (Thorazine), which have a cholestatic effect and may cause or worsen jaundice.

Maintaining Adequate Fluid Intake:

1. Provide frequent oral fluids as tolerated.
2. Administer I.V. fluids for patients with inability to maintain oral fluids.
3. Monitor intake and output.

Maintaining Adequate Rest and Activity:

1. Promote periods of rest during symptom-producing phase, according to level of fatigue.
2. Promote comfort by administering or teaching self-administration of analgesics as prescribed.
3. Provide emotional support and diversional activities when recovery and convalescence are prolonged.
4. Encourage gradual resumption of activities and mild exercise during convalescent period.

Ensuring Prevention of Disease Transmission:

1. Educate patient about disease and about disease transmission.
2. Emphasize the self-limiting nature of most forms of hepatitis and the need for follow-up of liver function tests.
3. Stress importance of proper public and home sanitation and of proper preparation and dispensation of foods.
4. Encourage specific protection for close contacts ((Immune globulin (Gammar-P), and Hepatitis B immune globulin) as soon as possible to blood or body fluid contacts of HBV patients, followed by HBV vaccine series.
5. Explain precautions to patient and family about transmission and prevention of transmission to others.
   A. Good hand washing and hygiene after using bathroom.
   B. voidance of sexual activity (especially for HBV) until free of HBsAg.
   C. Avoidance of sharing needles, eating utensils, and toothbrushes to prevent blood or body fluid contact (especially for HBV).

Preventing and Controlling Bleeding:

1. Monitor and teach patient to monitor and report signs of bleeding.
2. Monitor PT and administer vitamin K as ordered.
3. Avoid trauma that may cause bruising, limit invasive procedures, if possible, and maintain adequate pressure on needle stick sites.


Q&A
You have
Questions
We have
Answers