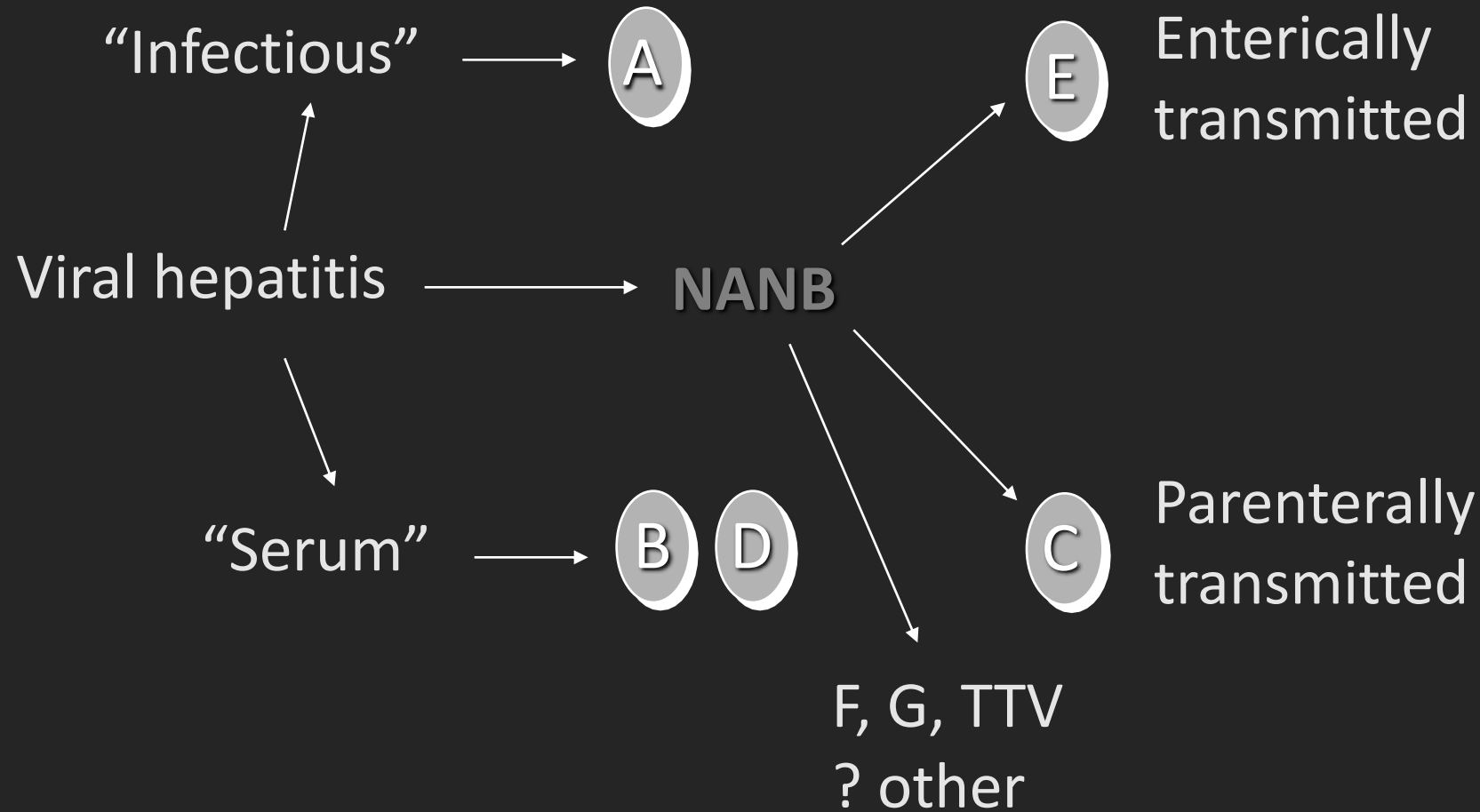


Hepatitis A-E Viruses

An Overview

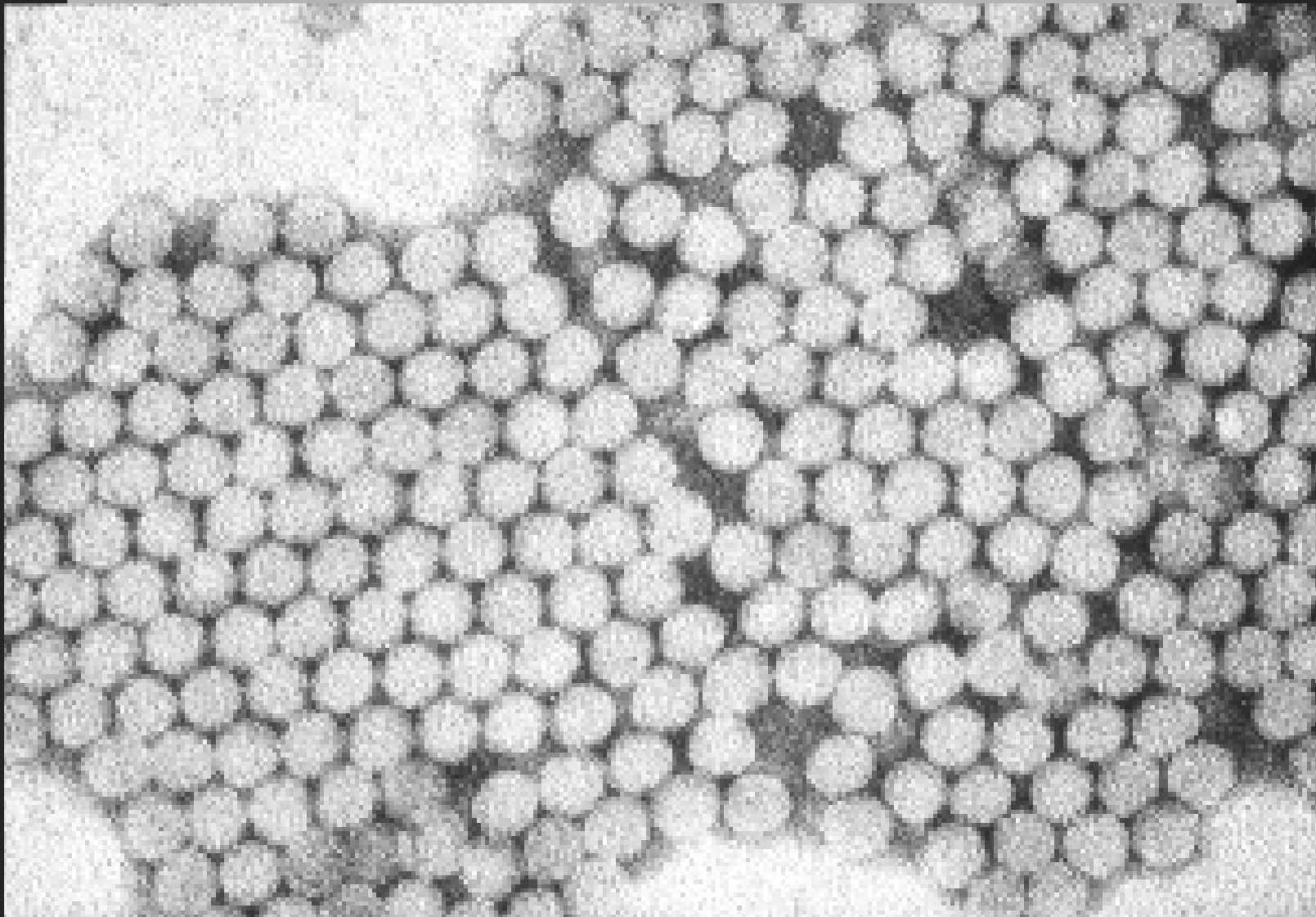
Viral Hepatitis - Historical Perspectives



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

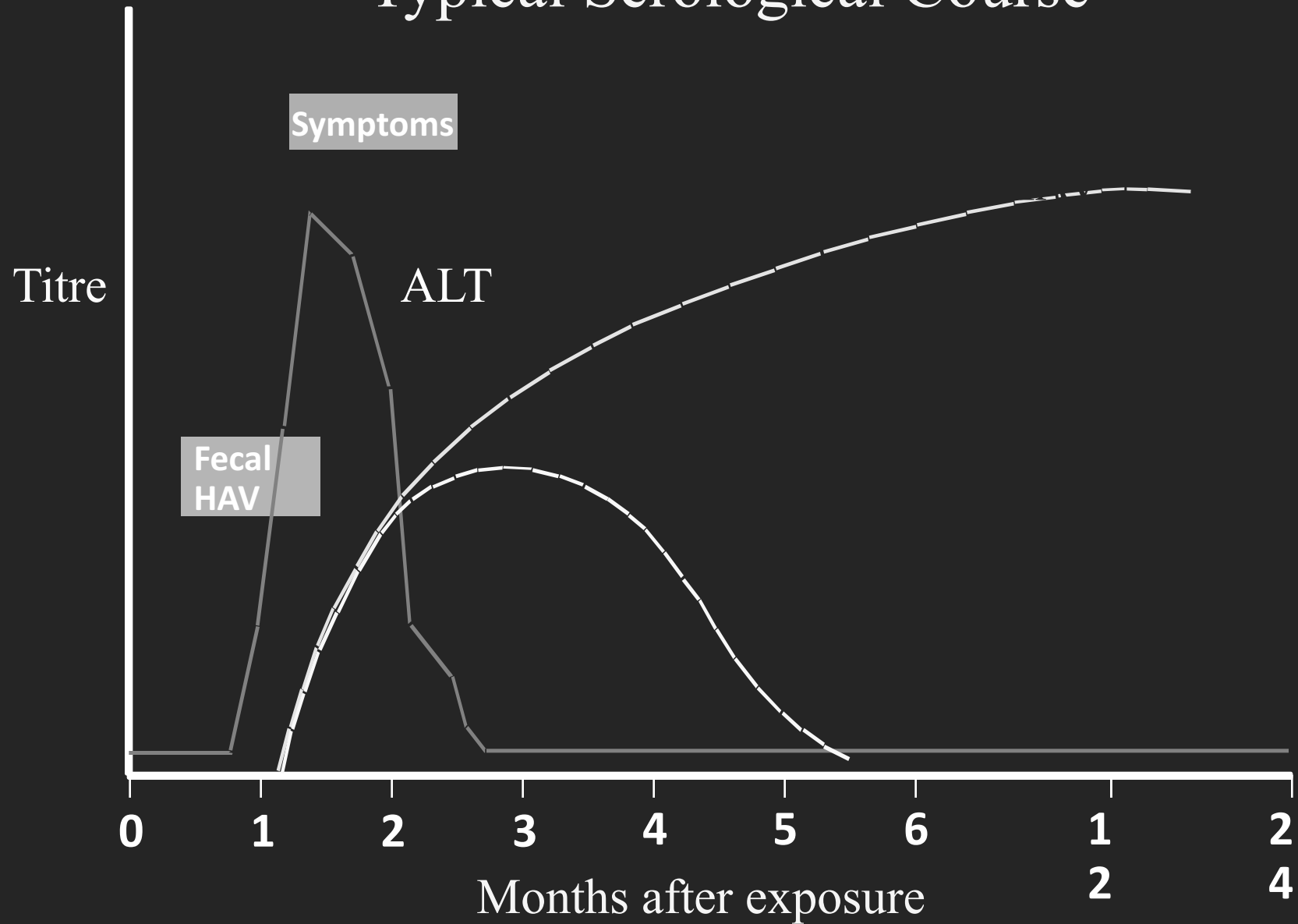


Hepatitis A - Clinical Features

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

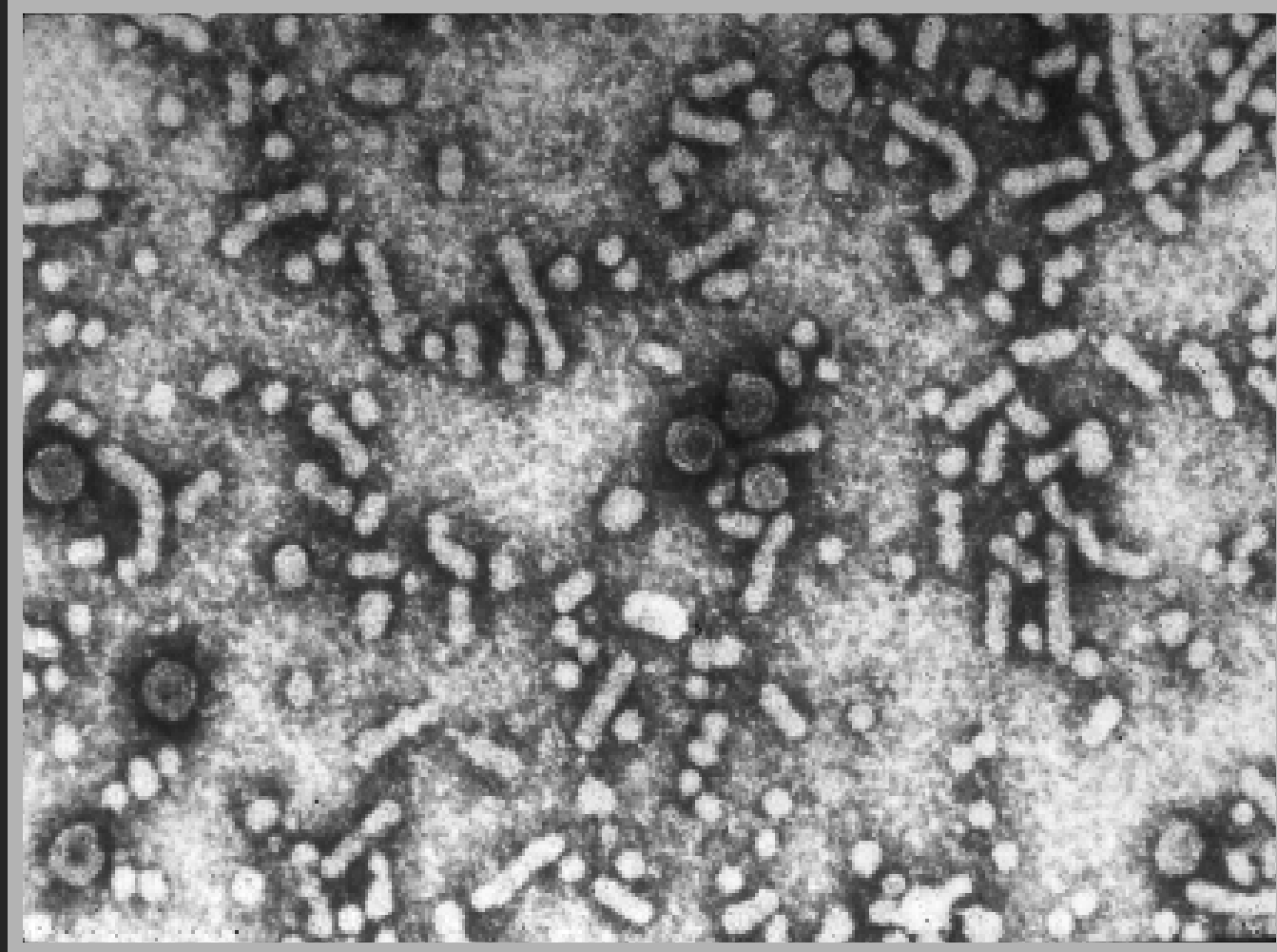
Global Patterns of Hepatitis A Virus Transmission

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 by EIA.**
- **Past Infection i.e. immunity is determined by the detection of HAV-IgG by EIA.**

Hepatitis B Virus



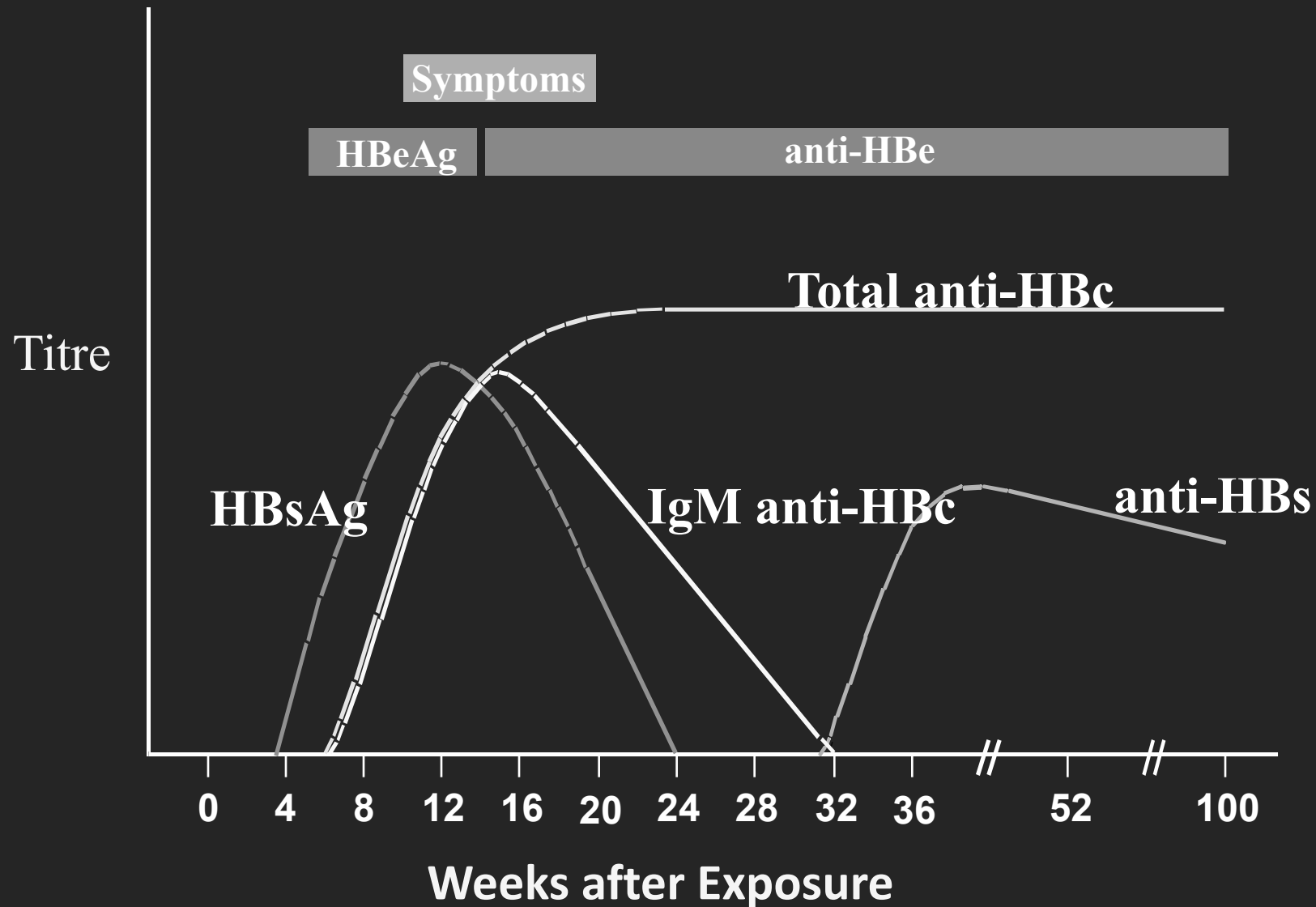
Hepatitis B - Clinical Features

- 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%

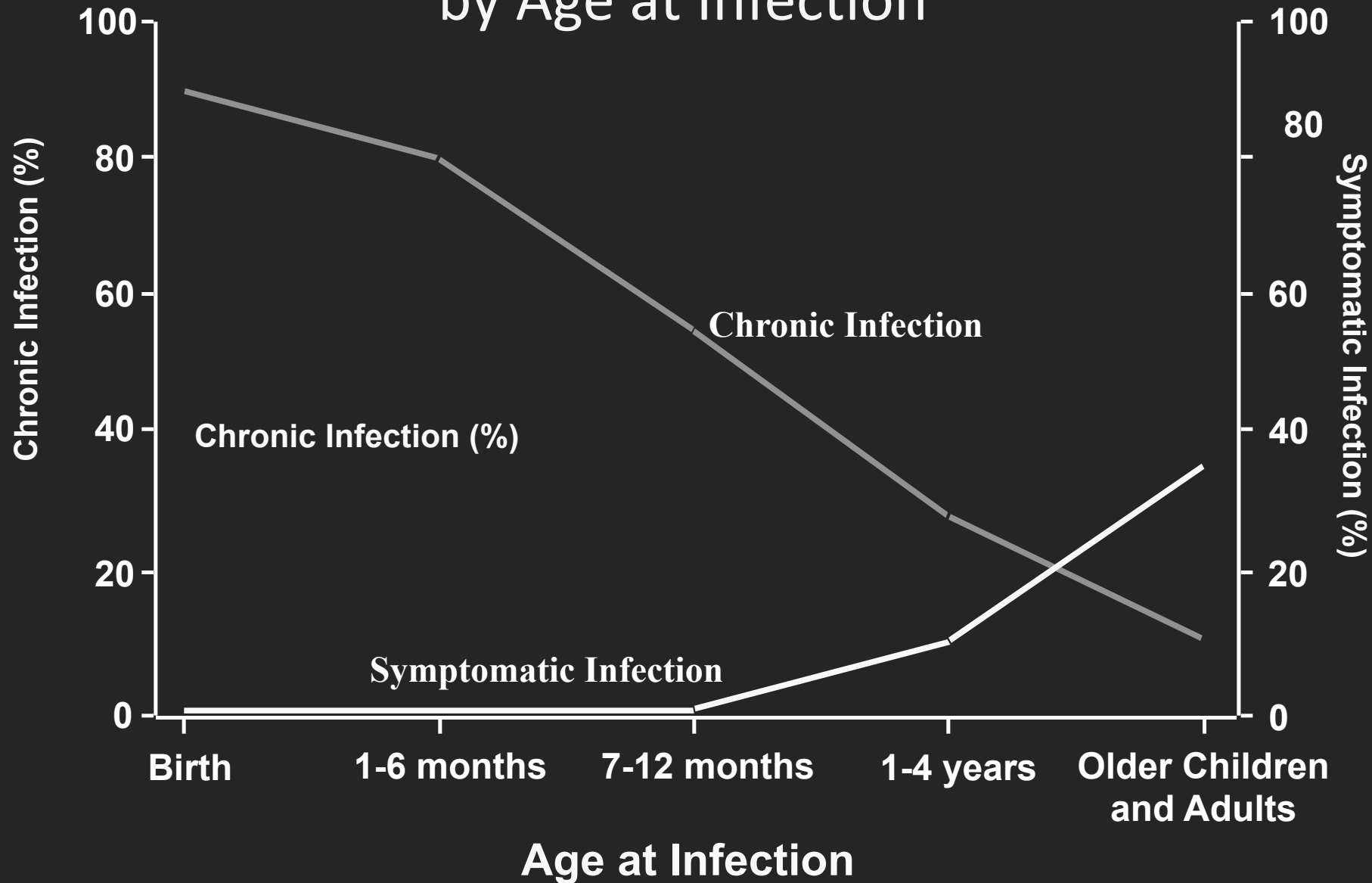
Spectrum of Chronic Hepatitis B Diseases

- 1. Chronic hepatitis B**
- 2. Cirrhosis of Liver**
- 3. Hepatocellular Carcinoma**

Acute Hepatitis B Virus Infection with Recovery Typical Serologic Course



Outcome of Hepatitis B Virus Infection by Age at Infection



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 - IVDA, 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.

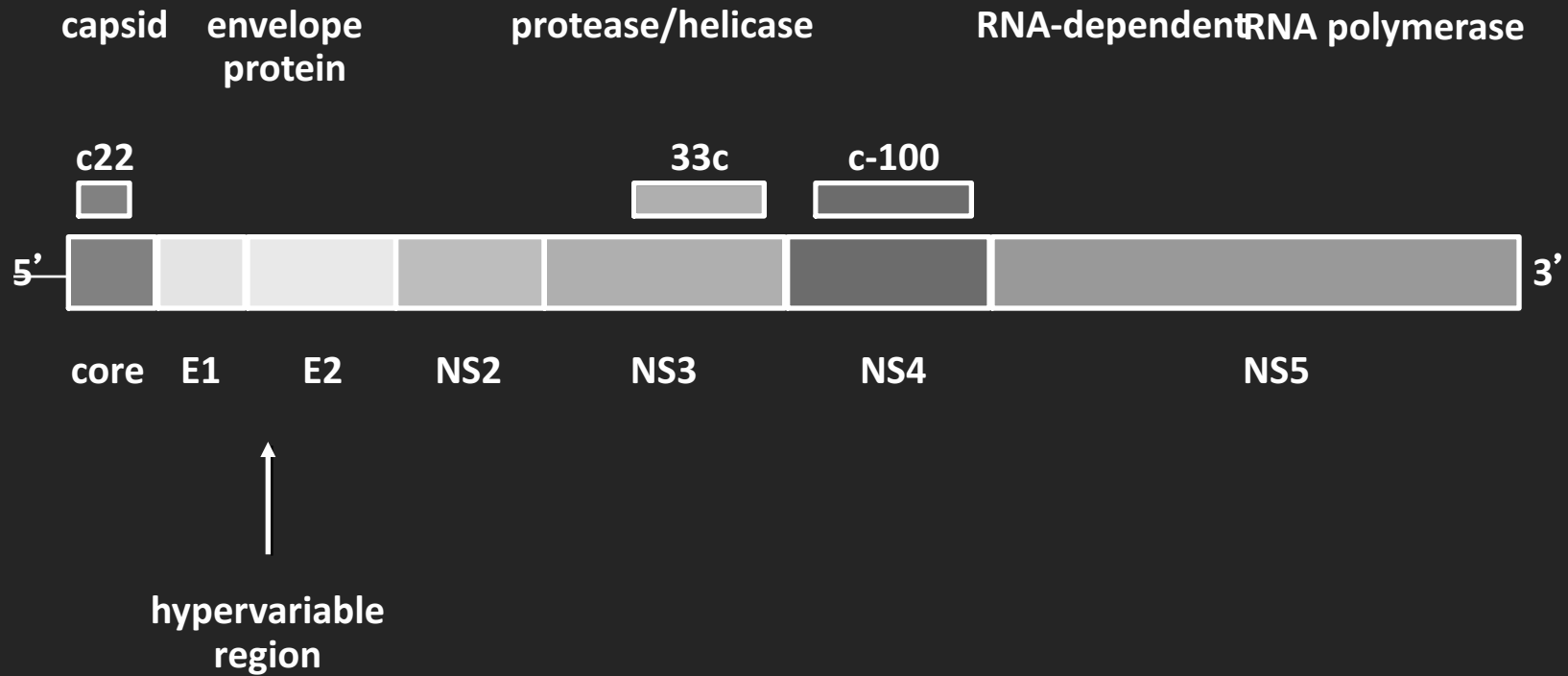
Diagnosis

- **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 infection.**
- **anti-HBc IgM - marker of acute infection.**
- **anti-HBcIgG - past or chronic infection.**
- **HBeAg - indicates active replication of virus and therefore infectiveness.**
- **Anti-Hbe - virus no longer replicating. However, the patient can still be positive for HBsAg which is made by integrated HBV.**
- **HBV-DNA - indicates active replication of virus, more accurate than HBeAg especially in cases of escape mutants. Used mainly for monitoring response to therapy.**

Prevention

- **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.**
- **Hepatitis B Immunoglobulin - HBIG may be used to protect persons who are exposed to hepatitis B. It is particularly 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.**
- **Other measures - screening of blood donors, blood and body fluid precautions.**

Hepatitis C Virus



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.**

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.**

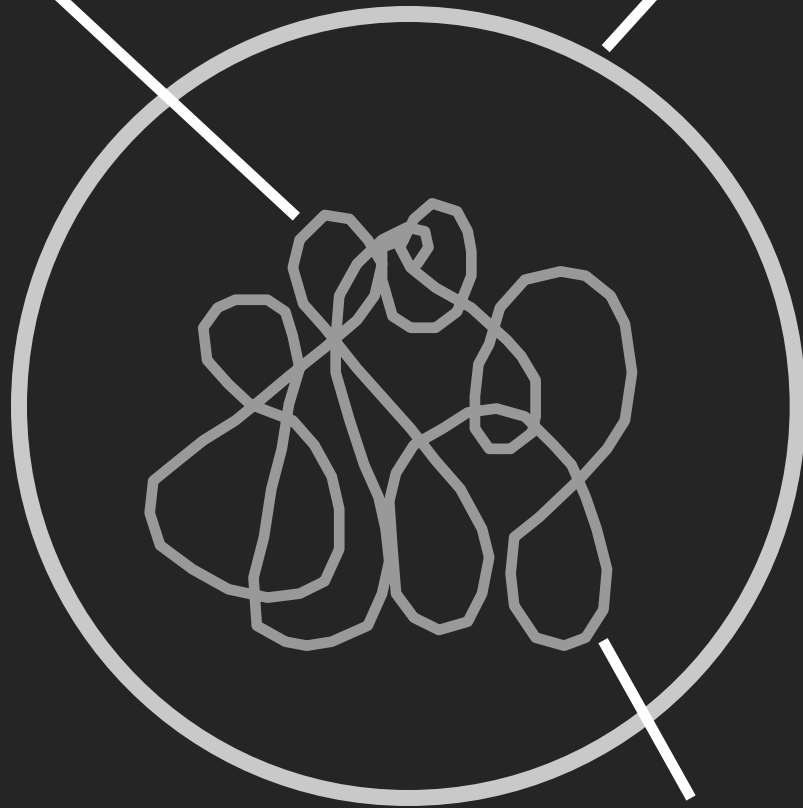
Prevention of Hepatitis C

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

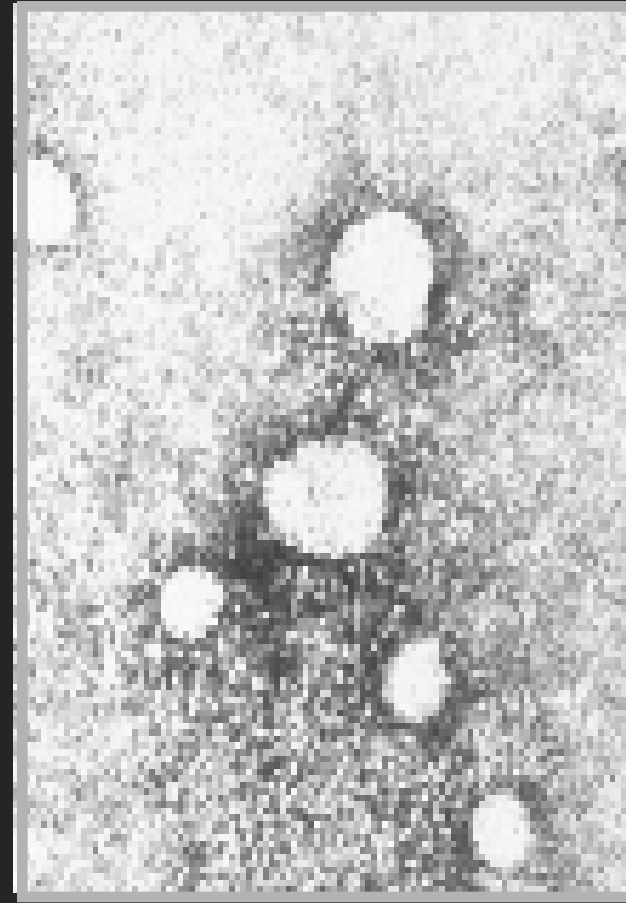
Hepatitis D (Delta) Virus

δ antigen

HBsAg



RNA



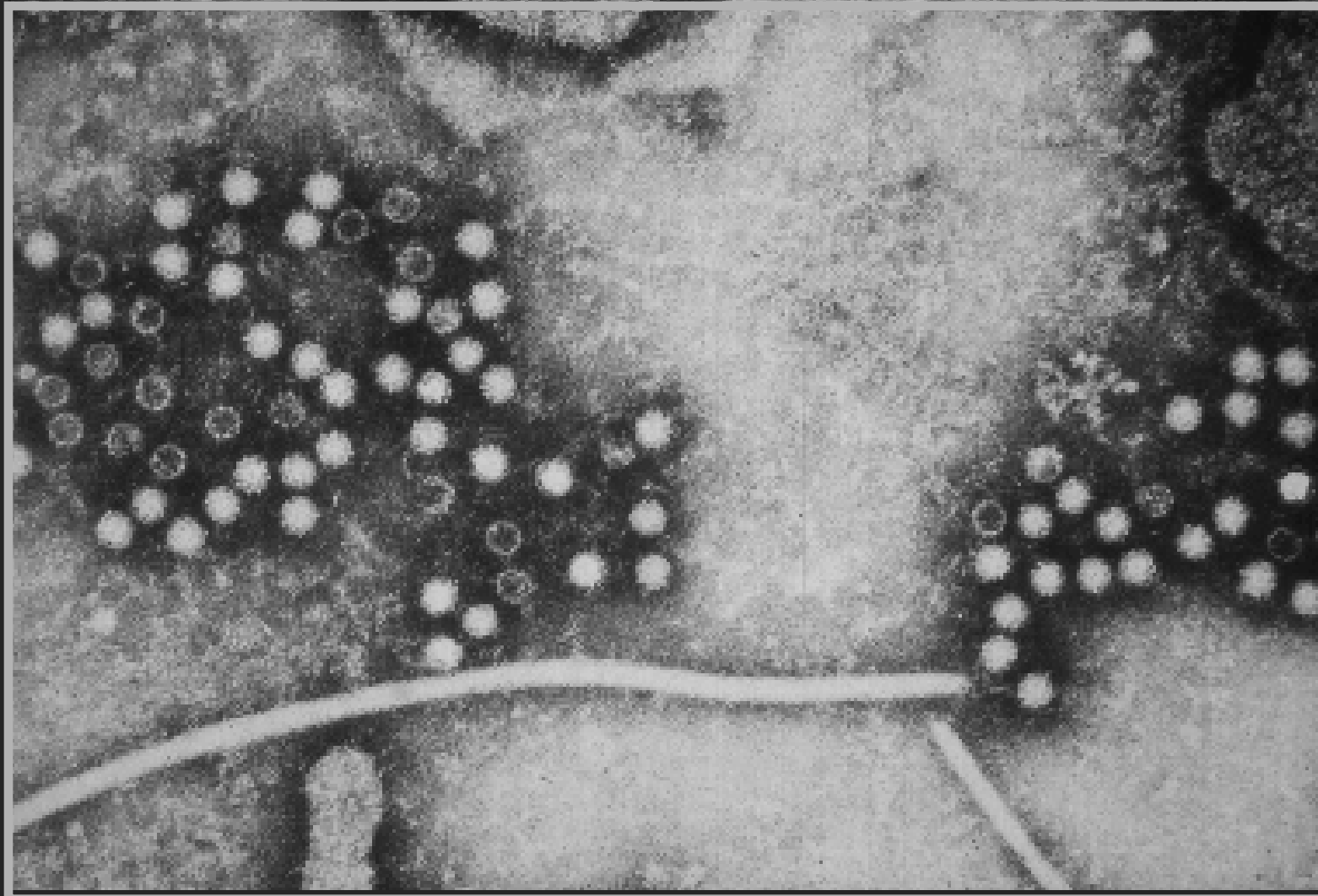
Hepatitis D - Clinical Features

- Coinfection
 - severe acute disease.
 - low risk of chronic infection.
- Superinfection
 - 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 E Virus



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