

# Hepatitis B Virus

*SROISIRI THAWEBOON*

HAA, H Ag, SH Ag, Australian Ag



HBsAg

300 million — hepatitis B carrier

1 million —> cirrhosis —> liver CA

Family : *Hepadnaviridae*

Genus : *Orthohepadnavirus*

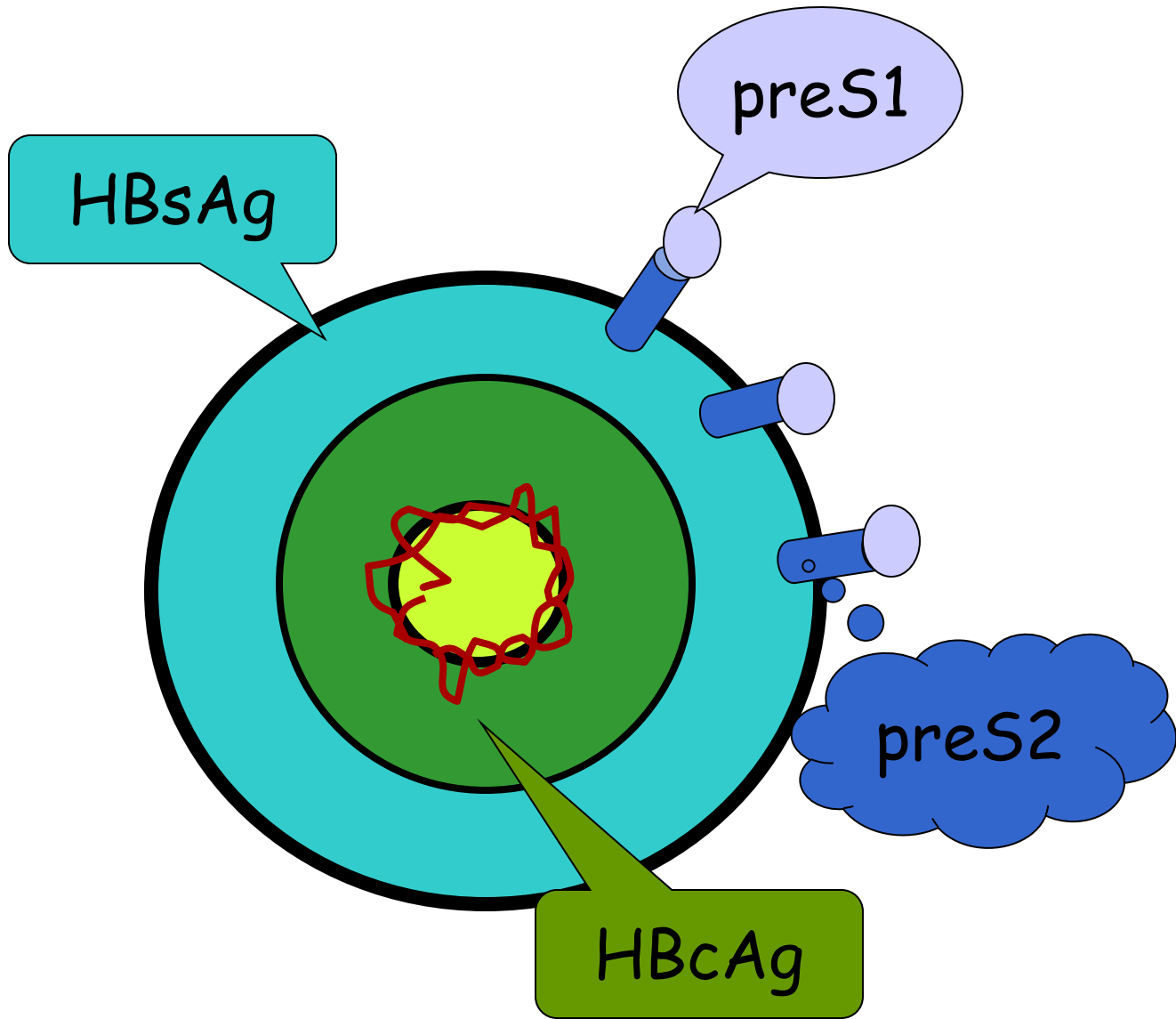
- Spherical  $\varnothing$  42 nm.

Envelope, icosahedral nucleocapsid (core)



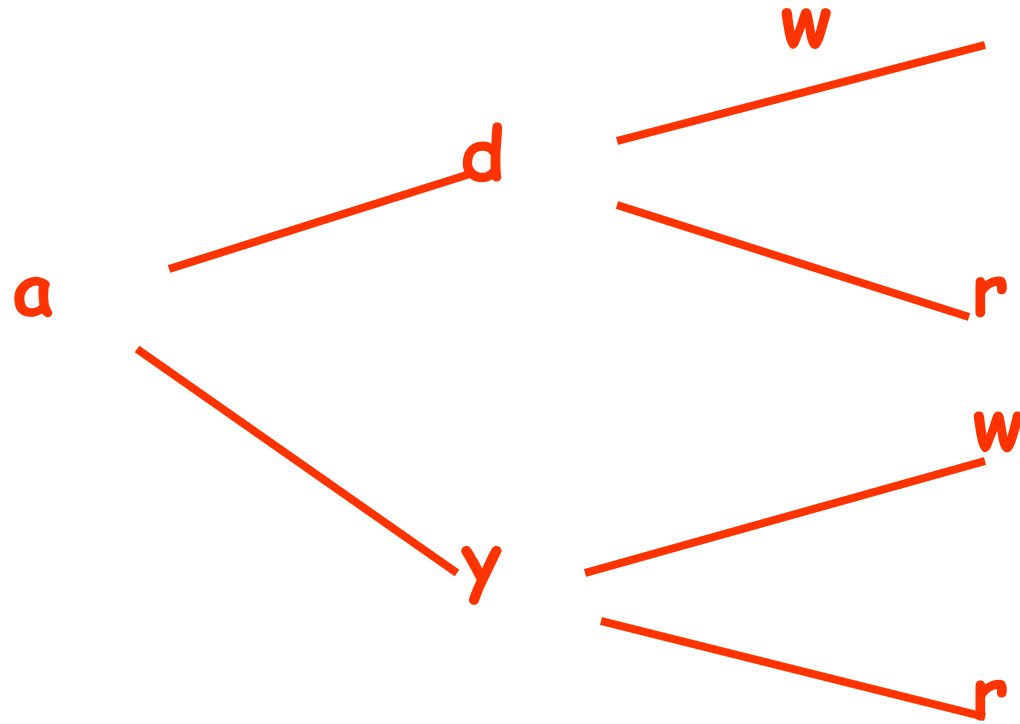
Dane particle

- glycoprotein envelope = HBsAg
- core (phosphoprotein) = HBcAg
- double stranded circular DNA
- 30 °C 6 month, 60 °C 4 h → tolerate



boil at 98 °C 20 min, dry heat at 160 °C 10h

- antigenic determinants (serotypes)



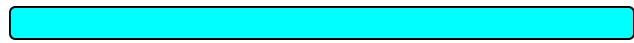
- Thai

adr 82%

adw 18%

# 1. HBsAg

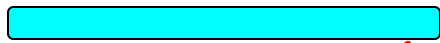
pre S/S gene



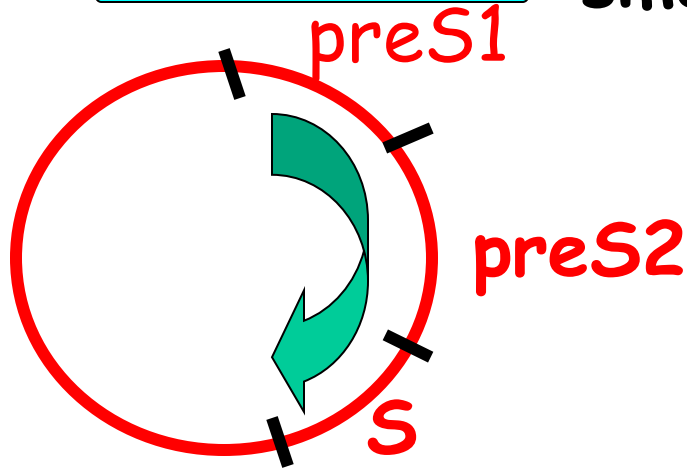
large (L) HBsAg 386 aa



middle (M) HBsAg 281 aa



small (S) HBsAg 226 aa



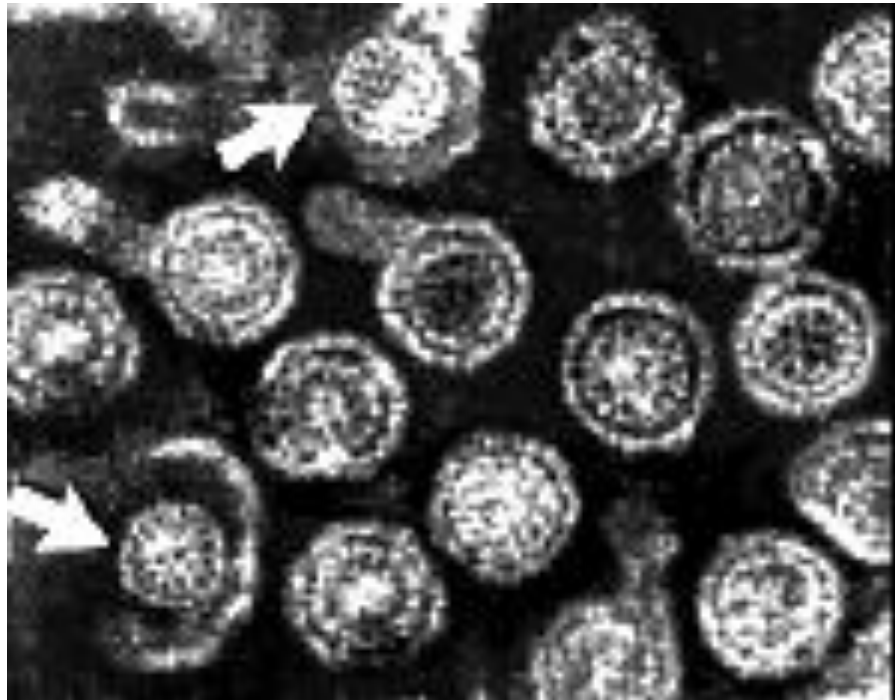
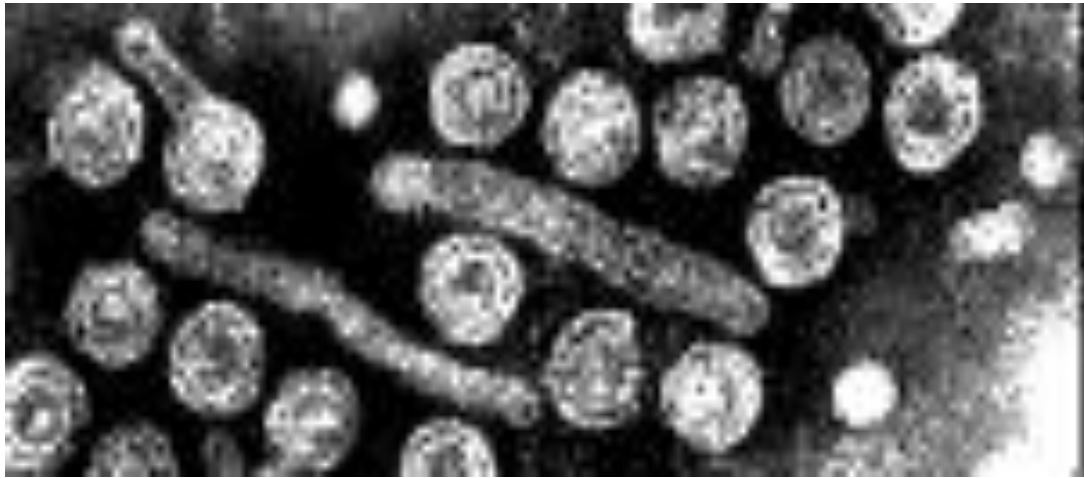
Major protein

Dane particle (infectious particle)

L:M:S=1:1:4

Free HBsAg in serum > Dane particle  $10^3-10^6$   
(non-infectious) fold  
 $10^3-10^9$  particles/ml

$\emptyset$  22 nm, filament L:M:S = 1:5:95





# Replication

- pre S1 bind receptor site on liver cell
- only genome was injected into cell by endocytosis
- transcription, translation → core
- entry into ER → golgi complex
- budding
- viral DNA integrate into host DNA

## Clinical

- subclinical infection

carrier



children

infant F < M

- 1/3 acute infection

adult

1. Preicteric phase (prodromal) 6-26 weeks

2. Icteric phase jaundice

3. Convalescence phase recover within 2-3 mth

10% carrier

1% fulminant hepatitis

chronic persistent hepatitis

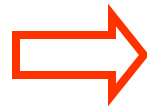
HBsAg in blood

chronic active hepatitis

HBV in blood

pathology

target

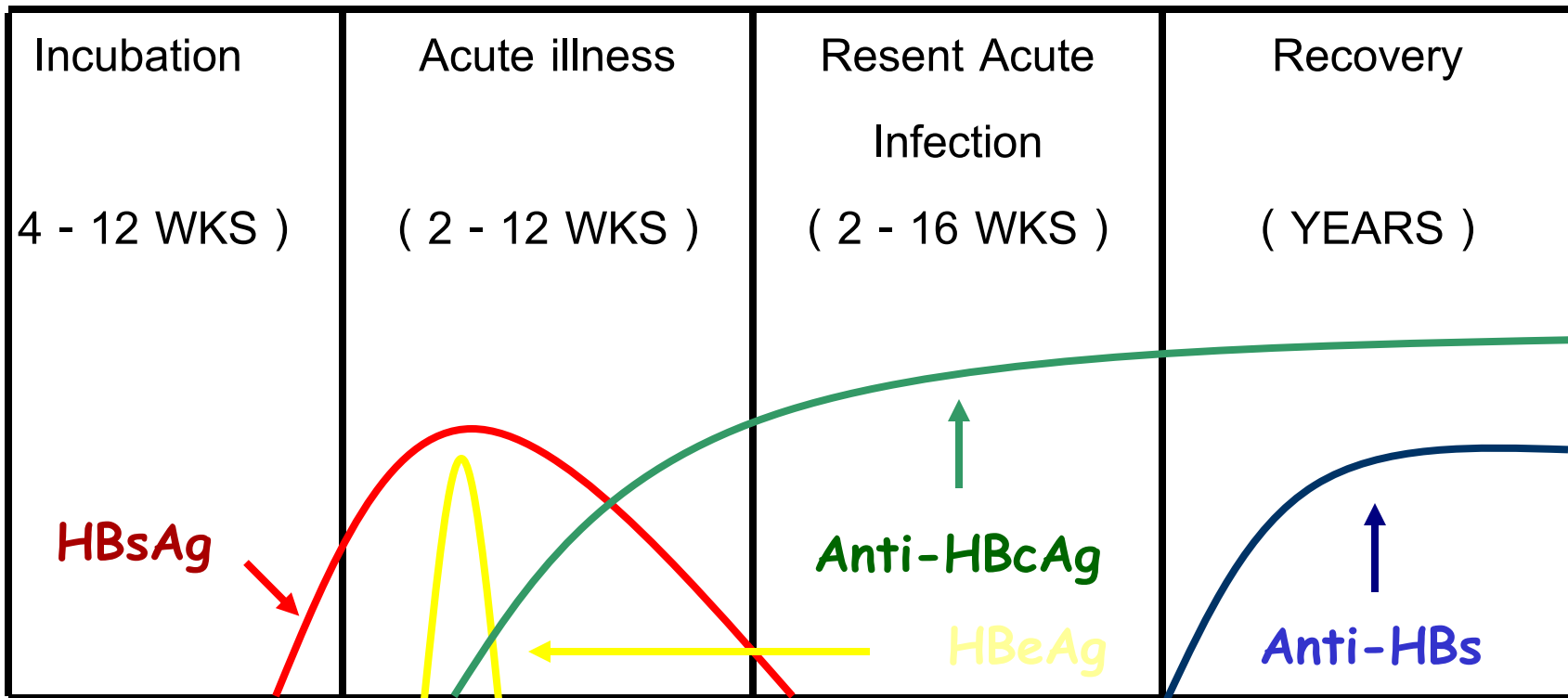


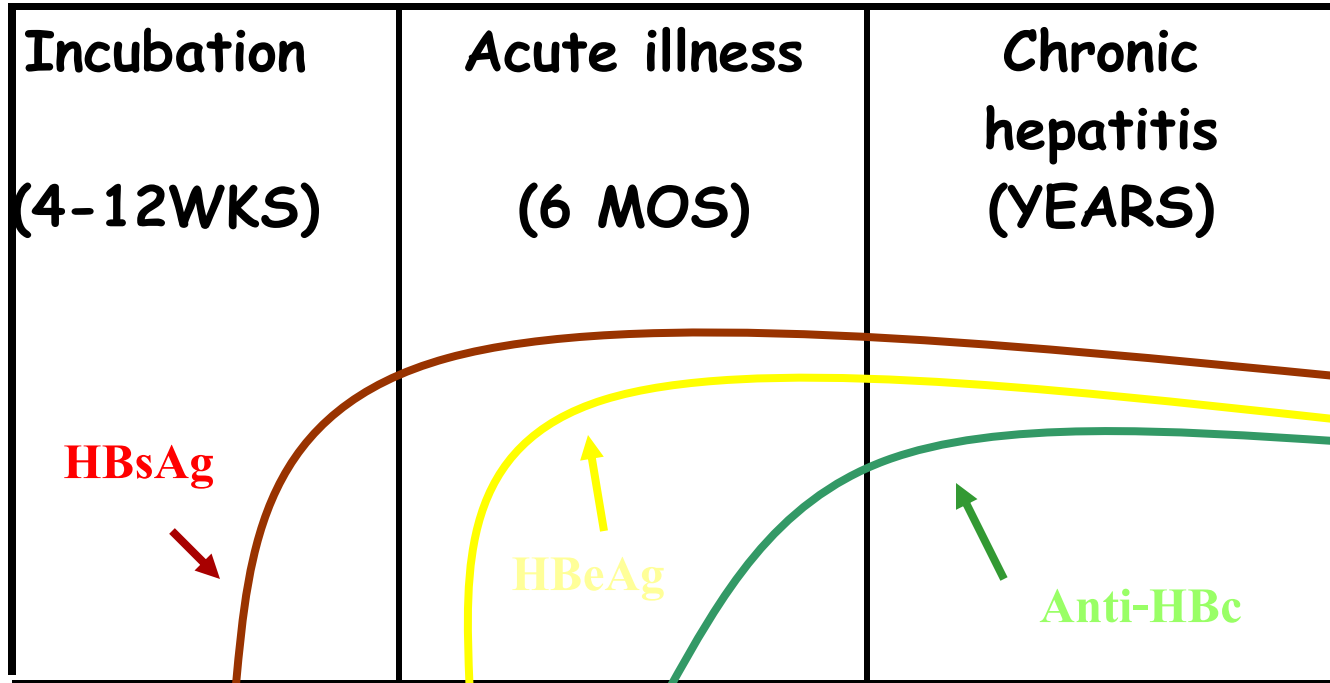
## Lab diagnosis

- serum ALT, AST      DNA → PCR
- markers    EIA, RIA (HBsAg, Anti-HBc, Anti-HBs)

## Epidemiology

- high > 8% Southeast Asia, China, perinatal
- moderate 2-7% Japan, Europe perinatal, children
- low < 2% USA, Australia      adult







## Developing country

**Perinatal transmission 85% if HBsAg+ve mother**

**80-95% carrier**

**Horizontal transmission in children**

**(carrier 50%)**

**adult (carrier 1-5%)**

## Prevention

- passive immunize HBIG postexposure prophylaxis (within 7 days)
- active immunize
  - plasma derived vaccine
  - recombinant vaccine CHO, yeast
  - pentavalent vaccine



Vaccine efficacy  $\longrightarrow$  40 IU

protective level 10 IU

- *non-responder*  $< 10$  IU
- *low-responder* 10-100 IU
- *good-responder*  $> 100$  IU

# Hepatitis D Virus

Hepatitis delta virus, delta agent



defective virus (HBV → helper virus)

Family ?

Genus *Deltavirus*

φ35-41 nm smaller than HBV

- HBsAg L:M:S = 1: 3:951
- HDsAg (S) delta AG-S, δAg-S 195 aa
- HDsAg (L) δAg-L 214 aa

single stranded circular RNA 1.7 kb

1. Co-infection IV drug user, hemophiliacs  
incubation 6 wk-6 mth

2. Superinfection HBV carrier incubation 3 wk

chronic active hepatitis  20% fatality  
75% cirrhosis

Epidemiology

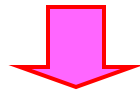
HBV endemic

Prevention

HBV vaccine

# Hepatitis C Virus

parenterally transmitted non-A, non-B  
hepatitis



HCV

Family : *Flaviviridae*      Genus : *Hepatitis C*

- 40-50 nm, envelope, icosahedral capsid
- single stranded RNA (+)
- human, chimpanzee (PBMC)

# pathology

incubation 2-26 wk (6-12 wk)

75% subclinical

25% symptom mild



20% cirrhosis

Lab diagnosis : anti-HCV (variety  
cannot be cultured)

*No vaccine !!*

# New Hepatitis

1. GB virus      GBV-A }  
                         GBV-B } *Flaviviridae*  
                         GBV-C similar to GBV-A

2. HGV = GBV-C

3. HFV feces            HAV, HEV

*The end*