

The ABCs of Viral Hepatitis

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CLU[®]



EQUITABLE

Goals

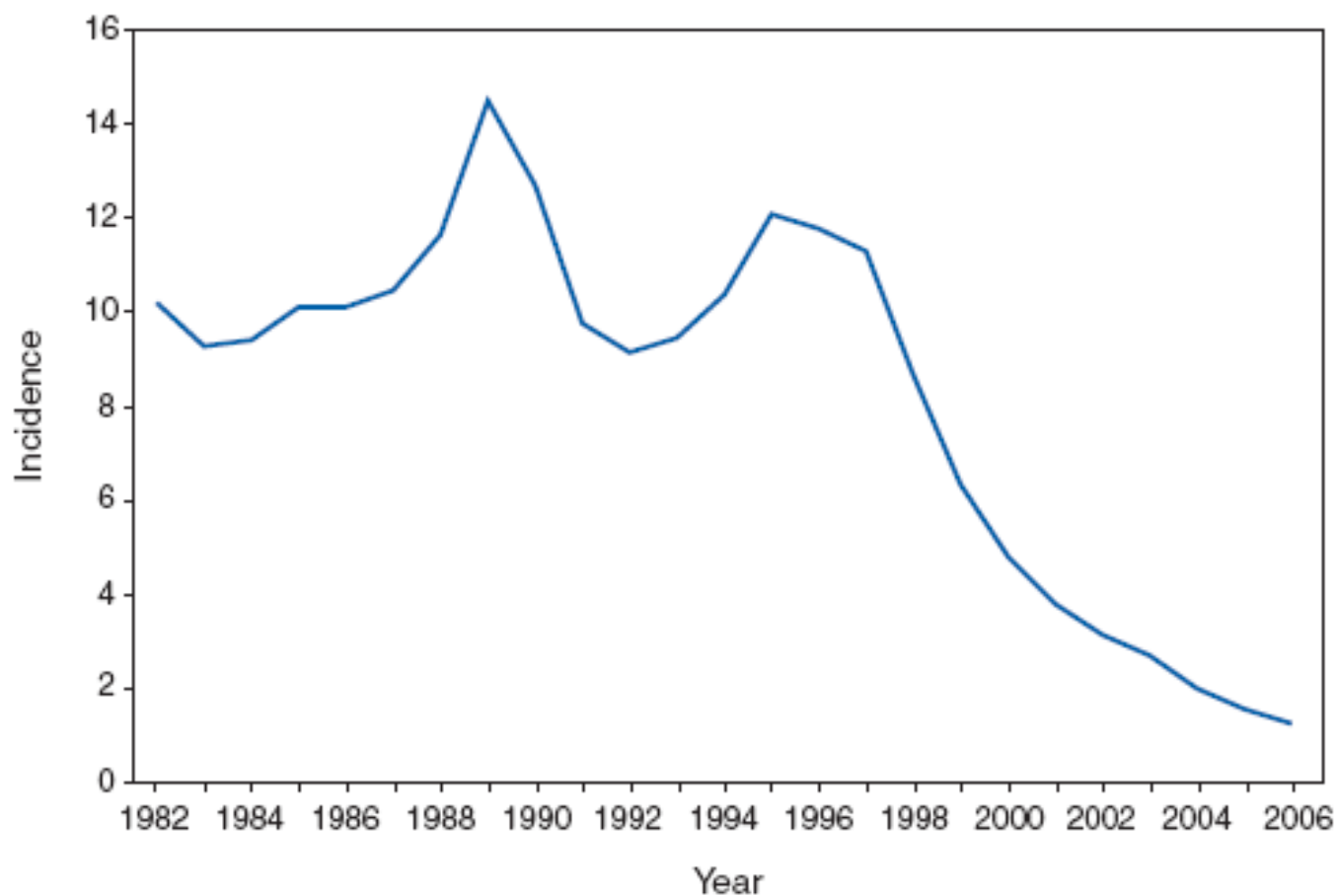
- Hepatitis A
- Hepatitis B
- Hepatitis C
- Complications
- Liver testing

Hepatitis A

- Transmitted fecal-oral route
- Self-limited
- Does not transition to chronic hepatitis



FIGURE 1. Incidence* of acute hepatitis A, by year — United States, 1982–2006

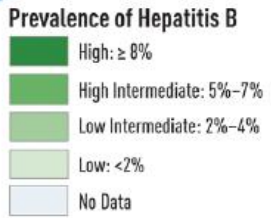


* Per 100,000 population.

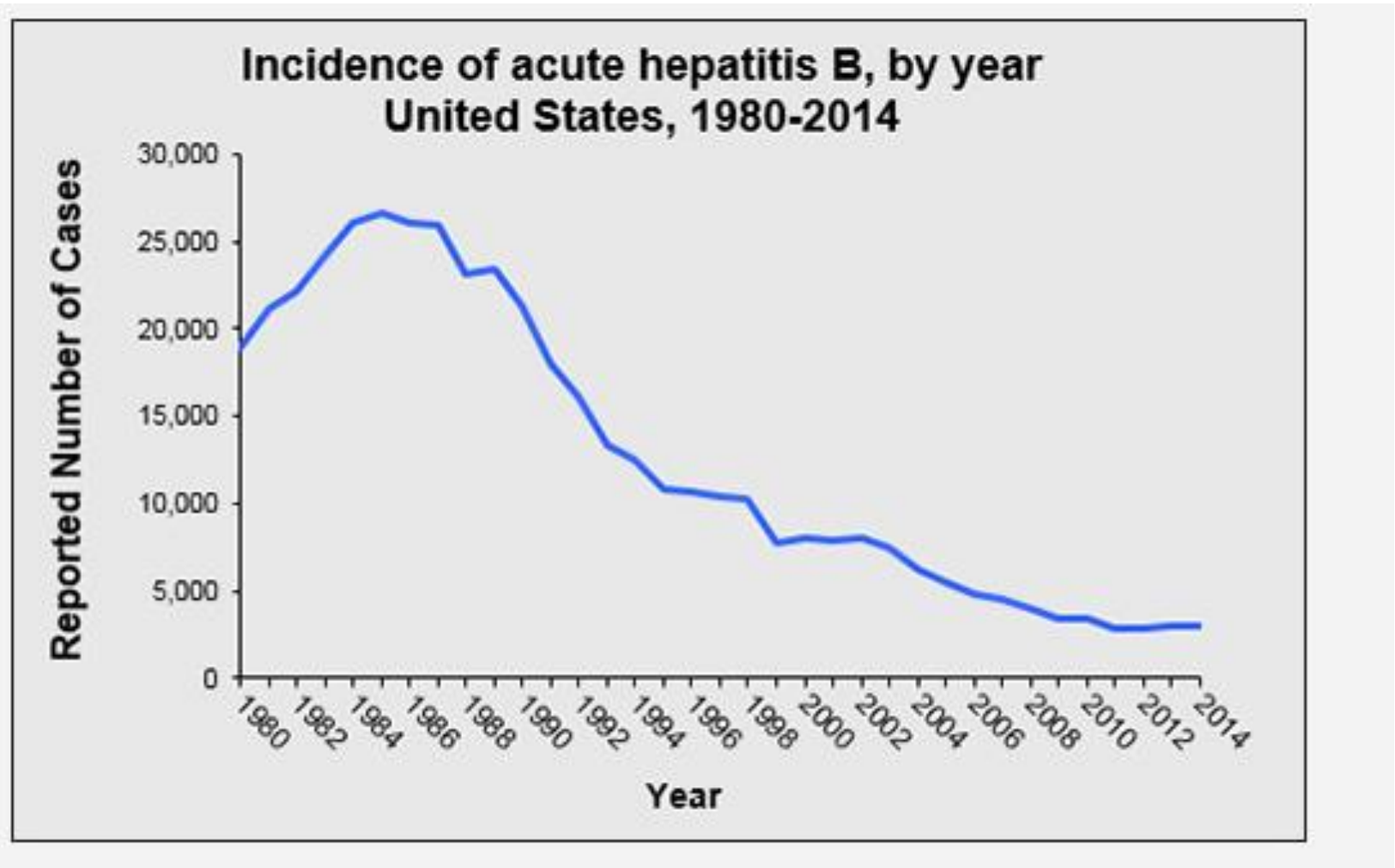
Hepatitis B

- Some information about the disease
- Review serologic markers
- Stages of disease
- Treatment, complications and prognosis

Prevalence



Vaccination 1982



Mode of Transmission

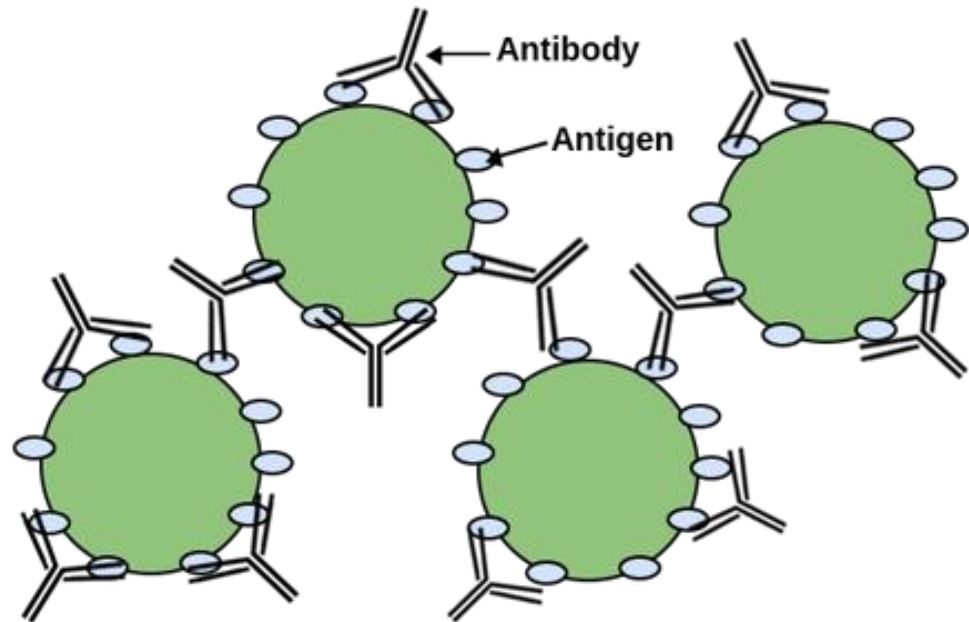
- Vertical
- IV drug use
- Sexual
- Close household contact
- Organ transplant recipient
- Transfusion

What do all these things mean?

- HepB surface antigen
- HepB surface antibody
- HepB core antibody
- HepB e antigen
- Hep e antibody
- HepB virus DNA

Markers

- Antigen – self vs. non-self
- Antibody – made by the host
 - IgM
 - IgG



IgM vs IgG

IMmediate



Long term



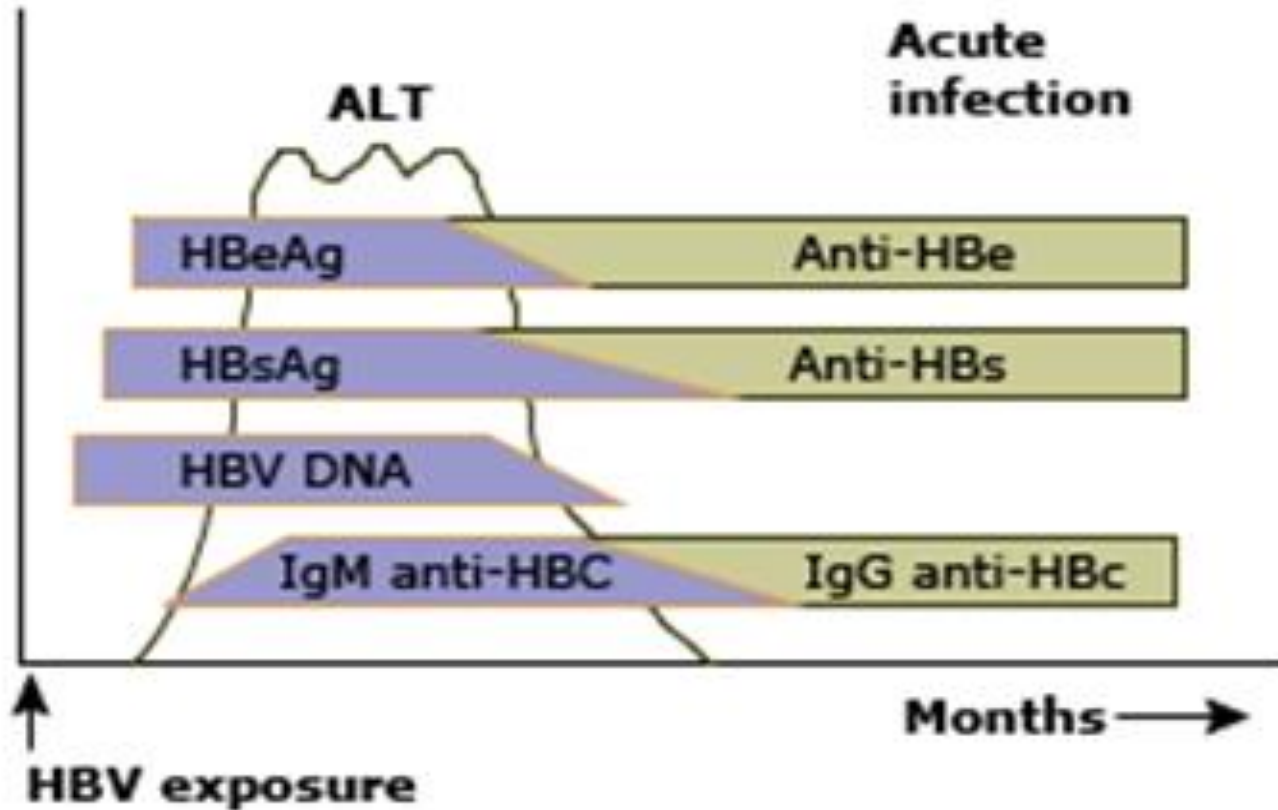
Antigens

- Surface (HBsAg) – First to appear
- E (HBeAg) – sign of viral replication
- Core – Not detectable in serum test

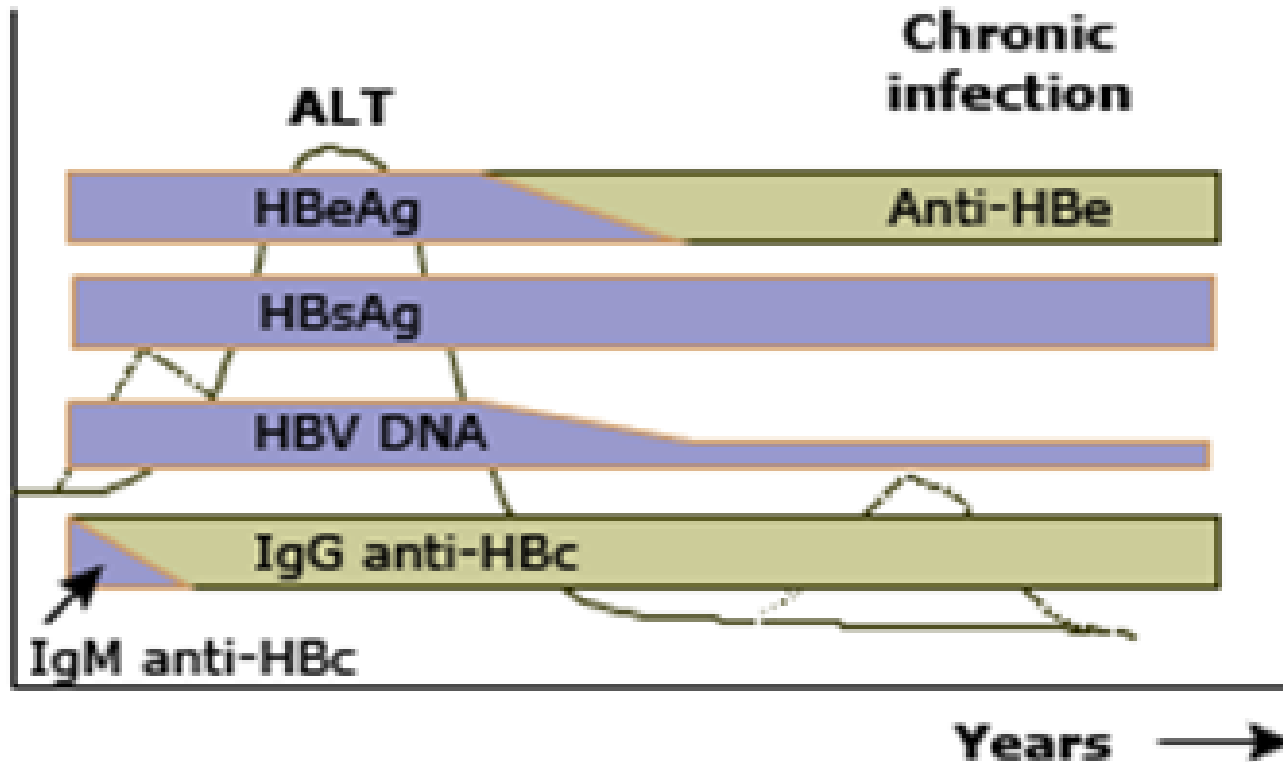
Antibodies

- Surface (Anti-HBs) – Immune
 - Can be from prior infection or immunization
- E (Anti-HBe)
- Core (Anti-HBc)
 - Indicates prior natural infection

Acute Hepatitis B



Chronic Hepatitis B



Chronic Hepatitis B

- Immune tolerance
- Immune-active, HBeAg-positive
- Inactive chronic HBV
- Immune-active, HBeAg negative
- Resolution of chronic hepatitis B

Immune tolerance

- HBsAG +
- HBeAG +
- AntiHBc +
- HB virus +++++
- ALT normal

Immune-active HBeAg-positive

- HBeAg ++++
- ALT +++
- Immune-mediated lysis of infected hepatocytes

Inactive Chronic Hepatitis B

- HBsAg +
- HBeAg –
- AntiHBc +
- AntiHBe +
- HB virus – or low
- ALT normal

Immune-active HBeAg negative

- Virus cannot produce HBeAg
- HBsAg +
- HBeAg –
- AntiHBc +
- AntiHBe +
- HB virus ++
- ALT abnormal

Resolution of chronic HBV infection

- HBsAg –
- Viral load undetectable or low
- Virus persists in the liver
- Progression to cirrhosis and hepatic failure is rare
- Risk of hepatocellular carcinoma persists

Who to treat?

- Sick people – treat
- Not so sick – maybe treat
- Not sick – don't treat



How to treat

- Interferon
- Nucleoside/nucleotide analogs
 - Entecavir
 - Tenofovir
 - Adefovir
 - Lamivudine
 - Telbivudine

Complications

- Cirrhosis
- Hepatic Decompensation
- Hepatocellular Carcinoma
 - AFP
 - US
- Extrahepatic manifestations
 - Polyarteritis nodosa
 - Glomerular disease
- Death

Worse prognosis

- Prolonged HBeAg phase
- High virus levels
- High HBsAg levels
- Diabetes
- Smoking
- Coinfection with Hep C, Hep D or HIV
- Alcohol use
- Obesity
- Fatty liver

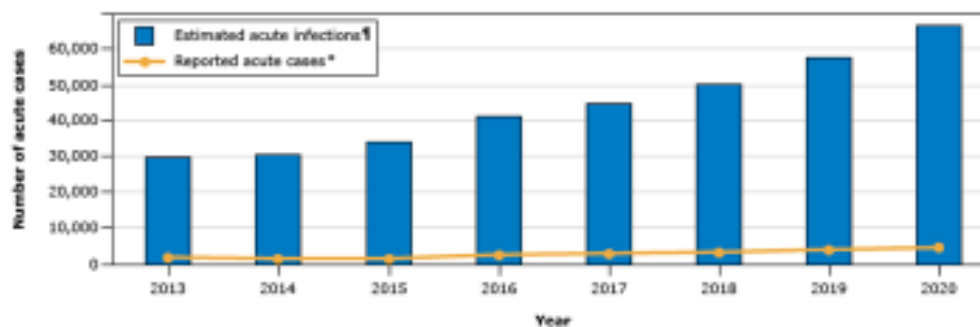
Hepatitis C

- Transmitted via blood
- Acute is first 6 months after exposure
- Most infected transition to chronic Hepatitis C
- Most are asymptomatic

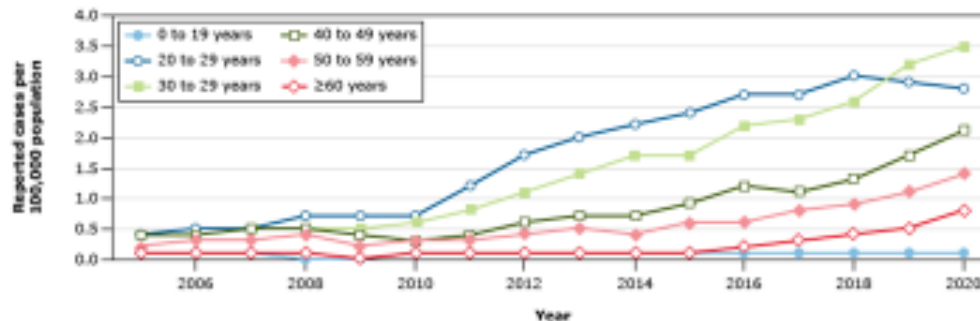


Incidence of hepatitis C virus cases in the United States, 2013 to 2020

A Number of reported cases^Δ of acute hepatitis C virus infection and estimated infections[¶] – United States, 2013 to 2020



B Rates^Δ of reported cases^Δ of acute hepatitis C virus infection, by age group – United States, 2005 to 2020



^Δ Reported confirmed cases.

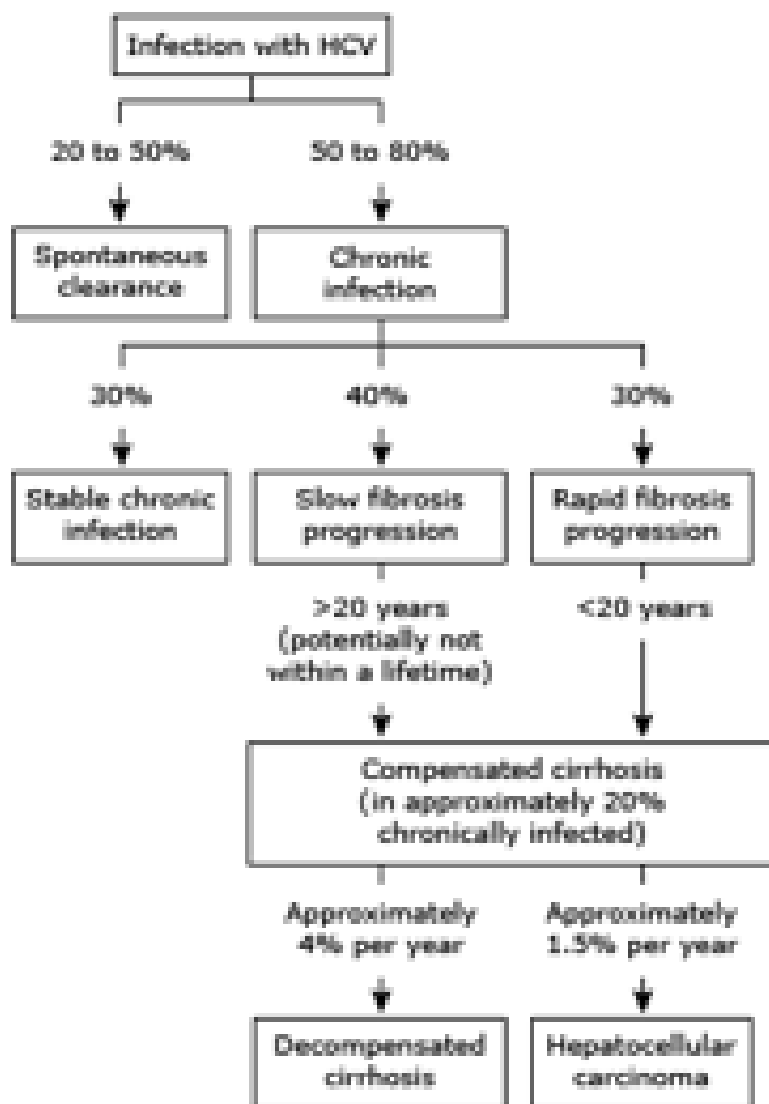
[¶] The number of estimated viral hepatitis infections was determined by multiplying the number of reported cases that met the classification criteria for a confirmed case by a factor that adjusted for underascertainment and underreporting.

^Δ Rates per 100,000 population.

Reproduced from: Viral Hepatitis Surveillance – United States: 2020 Surveillance, Hepatitis C. Centers for Disease Control and Prevention. Available at: <https://www.cdc.gov/hepatitis/statistics/2020surveillance/hepatitis-c.htm> (Accessed October 13, 2022).

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Natural history of hepatitis C virus



Cure

- Spontaneous viral response

 - Occurs naturally

 - Usually within 12 weeks

- Sustained viral response

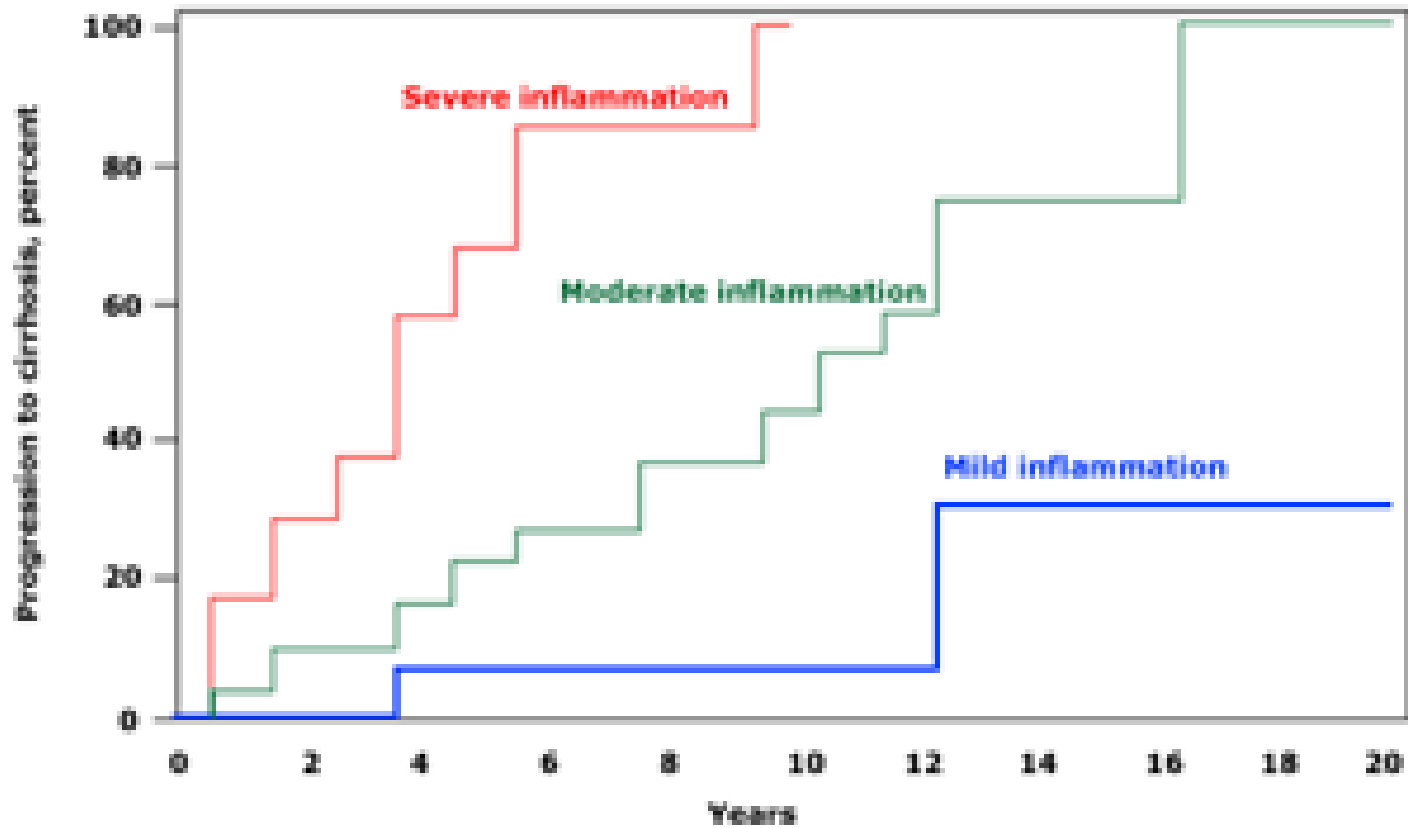
 - After successful treatment

 - Undetected virus 12 weeks after cessation of treatment

Hepatitis C

The best clinical predictor of disease progression in chronic HCV infection is the amount of baseline inflammation and fibrosis

Progression of hepatitis C to cirrhosis according to baseline inflammation on initial liver biopsy



Increased risk of disease progression

M>F

Acquisition after age 40

Race (white faster than black)

Comorbidities

HIV

HBV

DM

Obesity

Alcohol use

Daily MJ use

High cholesterol consumption

Coffee slows progression

There is generally a poor correlation between aminotransferase levels and liver histology

Treatment

- Direct-Acting Antiviral [DAA] regimens
- Disrupt viral replication and infection
- 8 – 12 weeks
- Does not prevent reinfection

Follow up

Patients who achieve an SVR and do not have bridging fibrosis or cirrhosis do not require any specific follow-up for their HCV infection

Patients with advanced fibrosis or cirrhosis, regardless of whether they attain an SVR, require ongoing monitoring (including liver ultrasonography every six months) because they continue to be at risk of hepatocellular carcinoma and other complications.

Cirrhosis in Chronic Hepatitis C

- Majority are silent
- Elevated serum bilirubin
- Hypoalbuminemia
- Thrombocytopenia

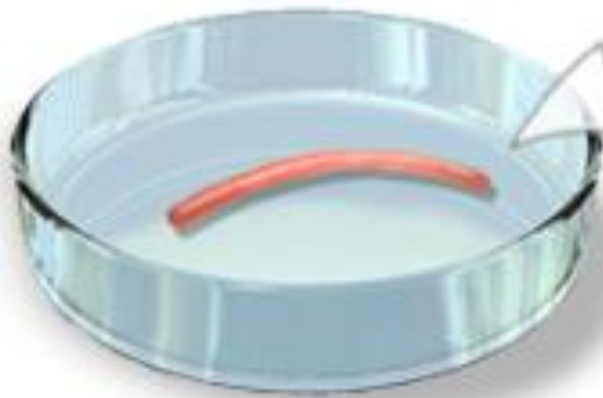


Biopsy vs. surrogate markers

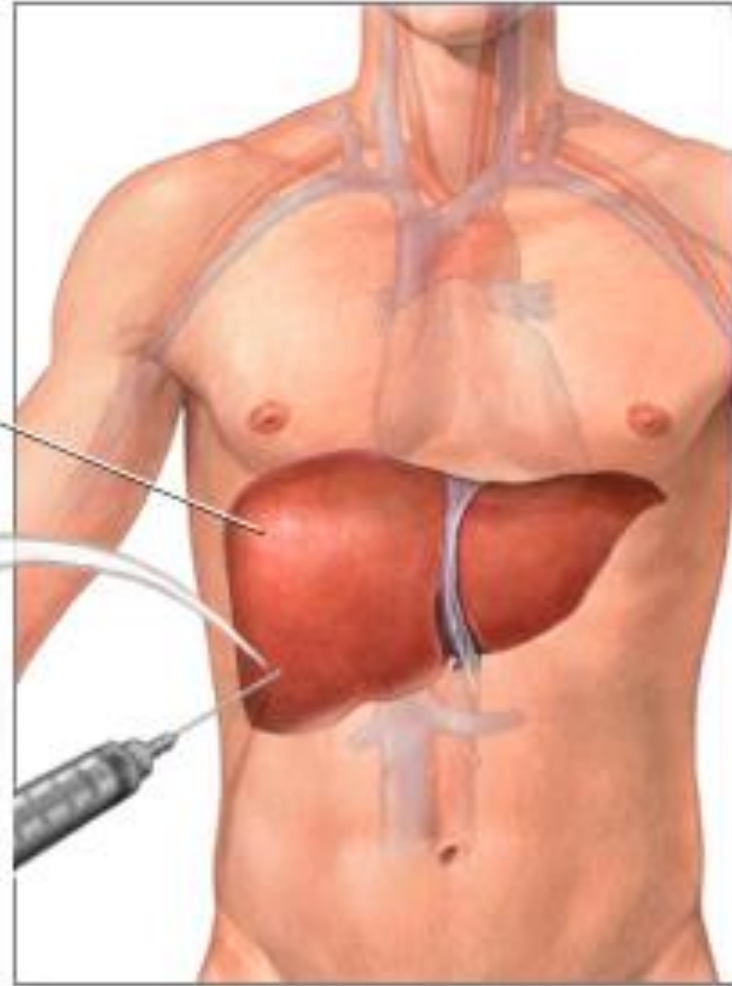
- Liver biopsy – gold standard
- Surrogate markers
 - Serologic
 - Fibrosure
 - HepaScore
 - Imaging
 - Fibroscan
 - MR elasticity

Liver biopsy

A small slender core of tissue is removed with a biopsy needle



Liver



Serologic scores

Fibrosure

Alpha-2-macroglobulin

Haptoglobin

Gamma globulin

Apolipoprotein A1

GGT

Total bilirubin

Age

Gender

HepaScore

$= y / (y + 1)$

$Y = \exp[-4.185818 - (0.0249 \times \text{age}) + (0.7464 \times \text{sex})$

$+ (1.0039 \times \text{alpha2-macroglobulin}) + (0.0302 \times \text{hyaluronic acid})$

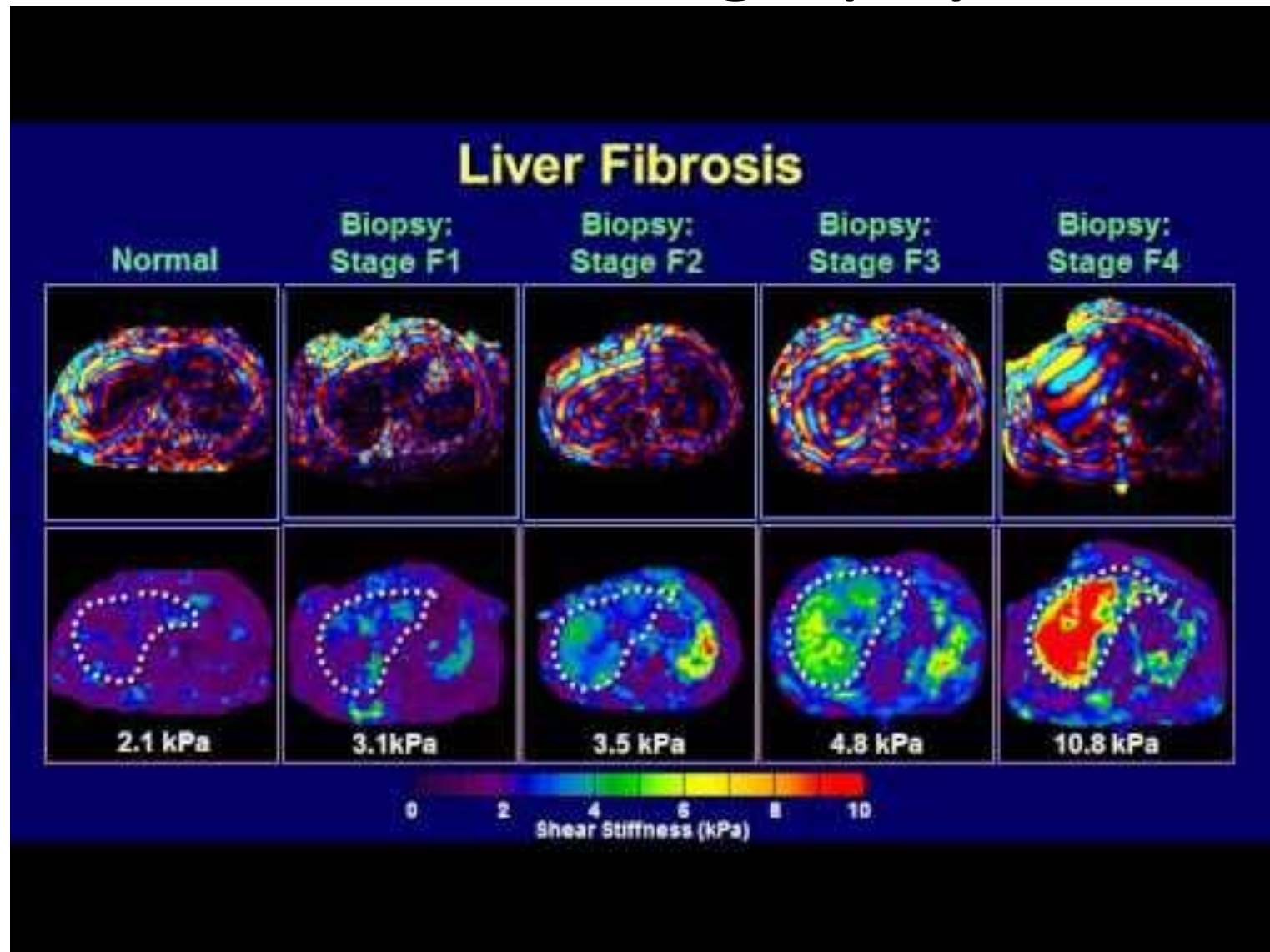
$+ (0.0691 \times \text{bilirubin}) - (0.012 \times \text{GGT})]$

Score from 0-1

FibroScan



MRI elastography



Fibrosis

- F0 – no fibrosis
 - F1 – portal fibrosis without septa
 - F2 – a few septa
 - F3 – numerous septa without cirrhosis
 - F4 – cirrhosis
-
- Significant fibrosis \geq F2

Cirrhosis

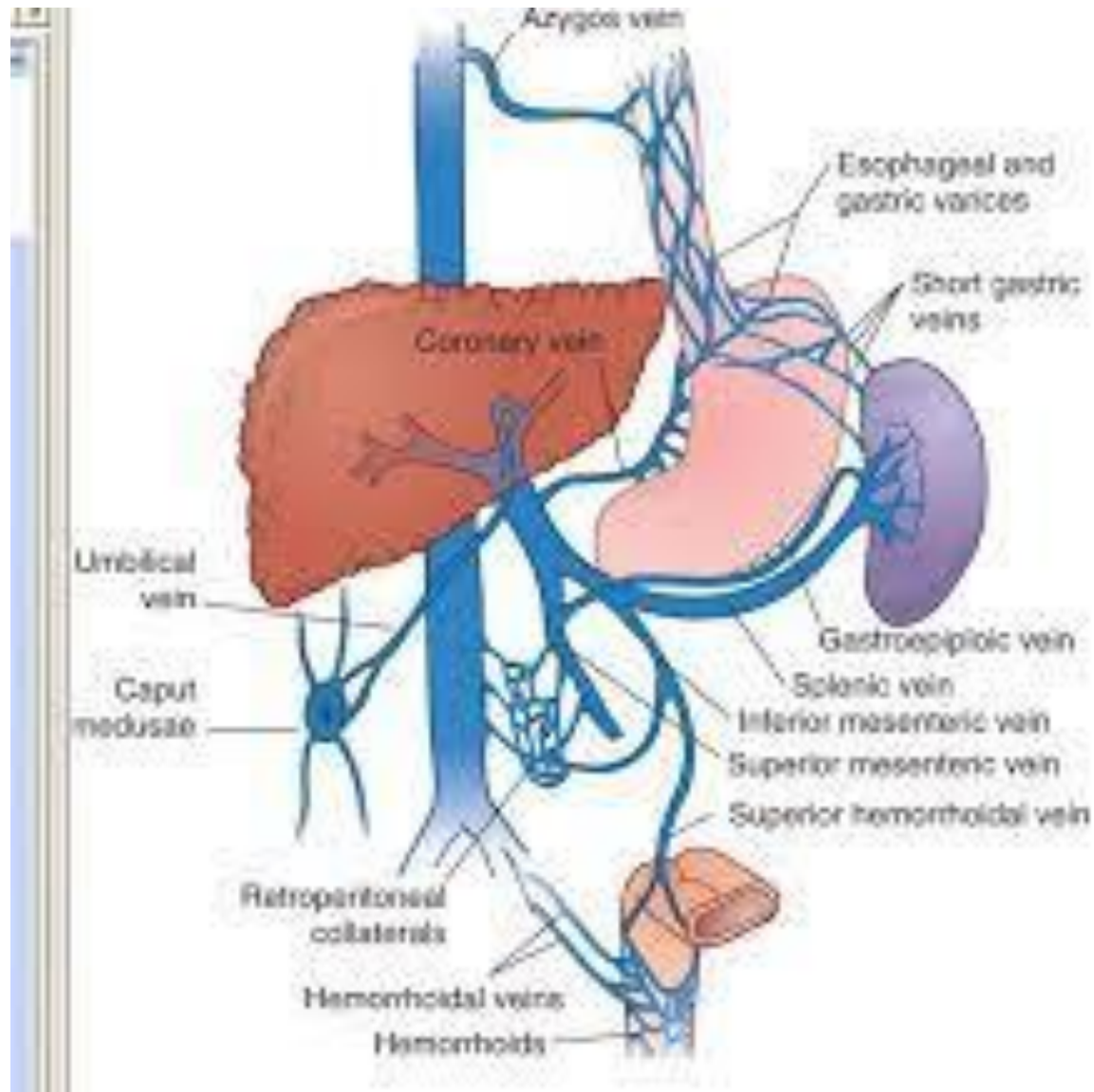
Complications

- Coagulopathy
- Jaundice
- Portal hypertension
- Esophageal varices
- Ascites
- Hepatocellular carcinoma

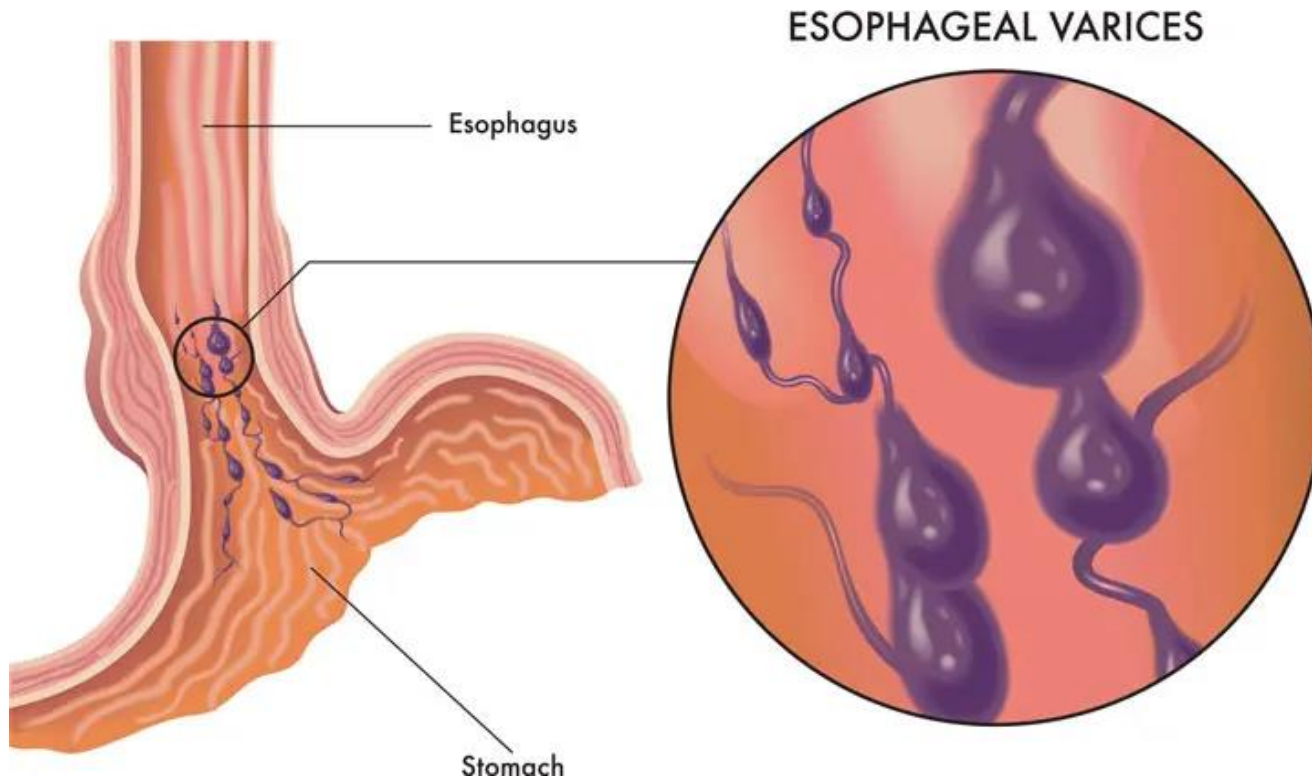
Jaundice



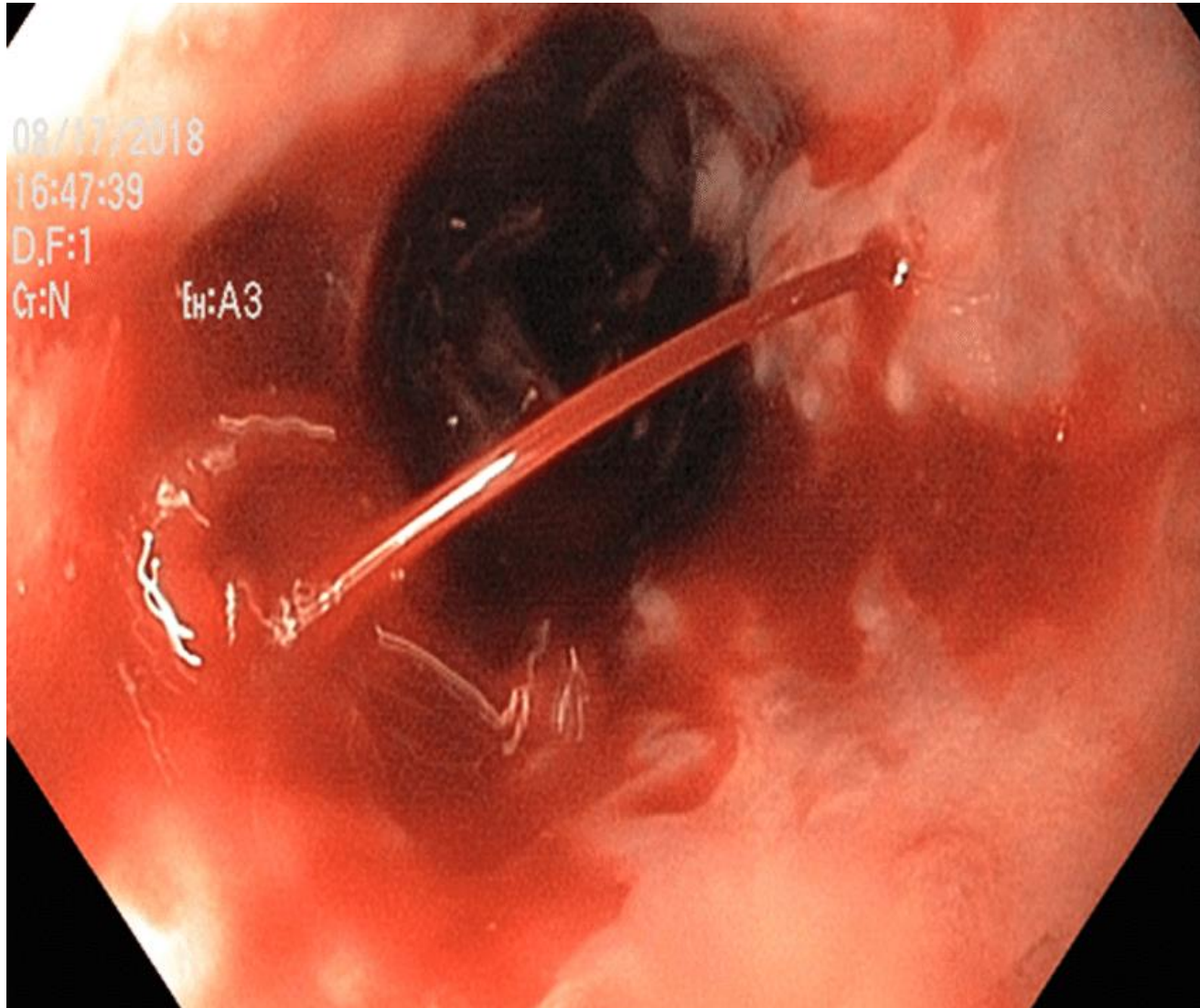
Portal hypertension



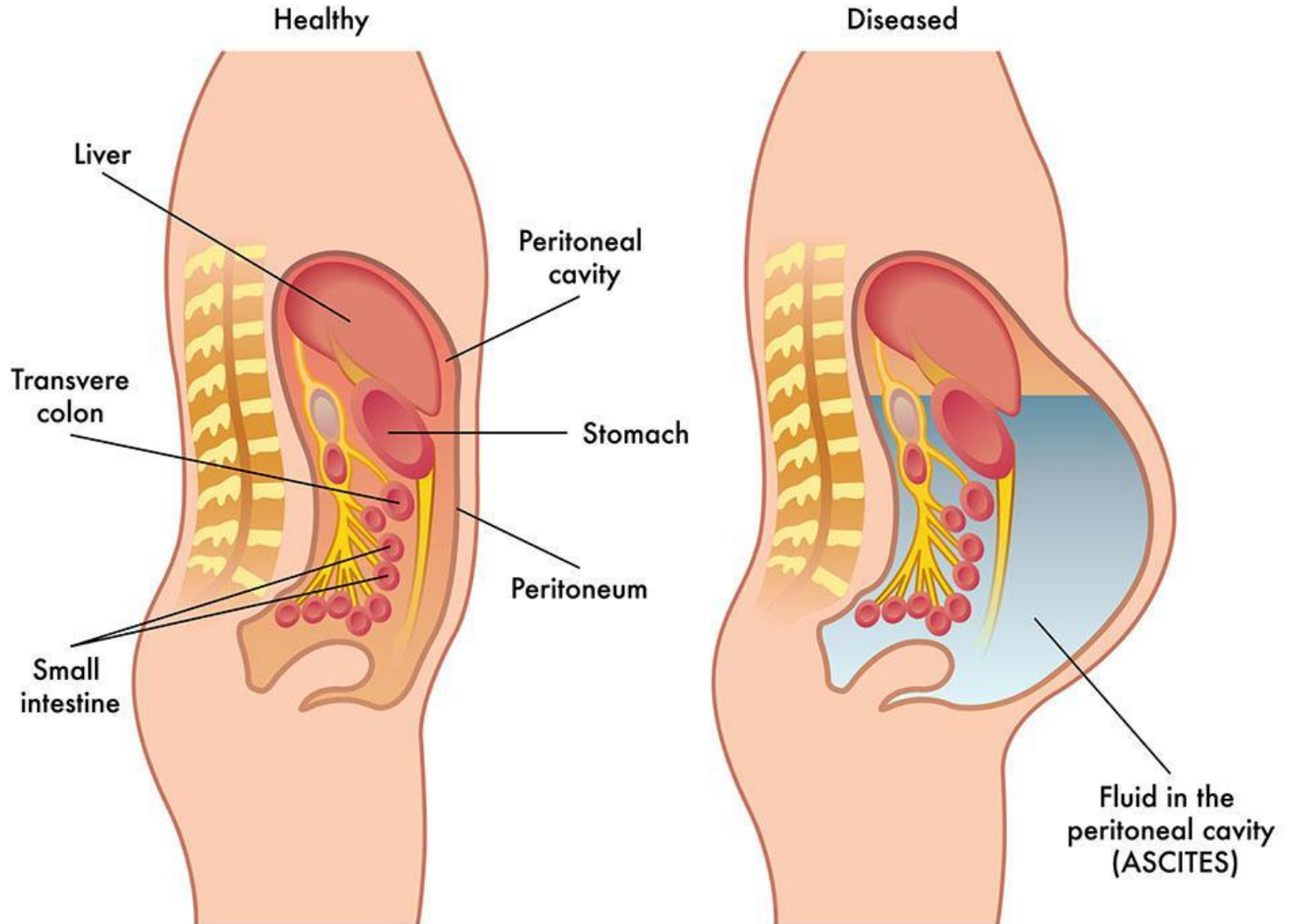
Esophageal varices



Esophageal varices



Ascites



Ascites



Summary

- Hepatitis A



- Hepatitis B

- Know what the serology means



- Hepatitis C

- Curable



- Mortality mainly driven by fibrosis and cirrhosis



Questions?

