Epidemiology of viral hepatitis

PART 2

HBV Vaccination

- Pregnant or breastfeeding people should be vaccinated if they are at risk for getting hepatitis B.
- Pregnancy or breastfeeding are not contraindication to avoid hepatitis B vaccination.
- People with minor illnesses, such as a cold, may be vaccinated.
- People who are moderately or severely ill should usually wait until they recover before getting hepatitis B vaccine.

Risks of a vaccine reaction

- Soreness where the shot is given or fever can happen after hepatitis B vaccination.
- People sometimes faint after medical procedures, including vaccination.
- Tell your provider if you feel dizzy or have vision changes or ringing in the ears.
- There is a very remote chance of a vaccine causing a severe allergic reaction, other serious injury, or death

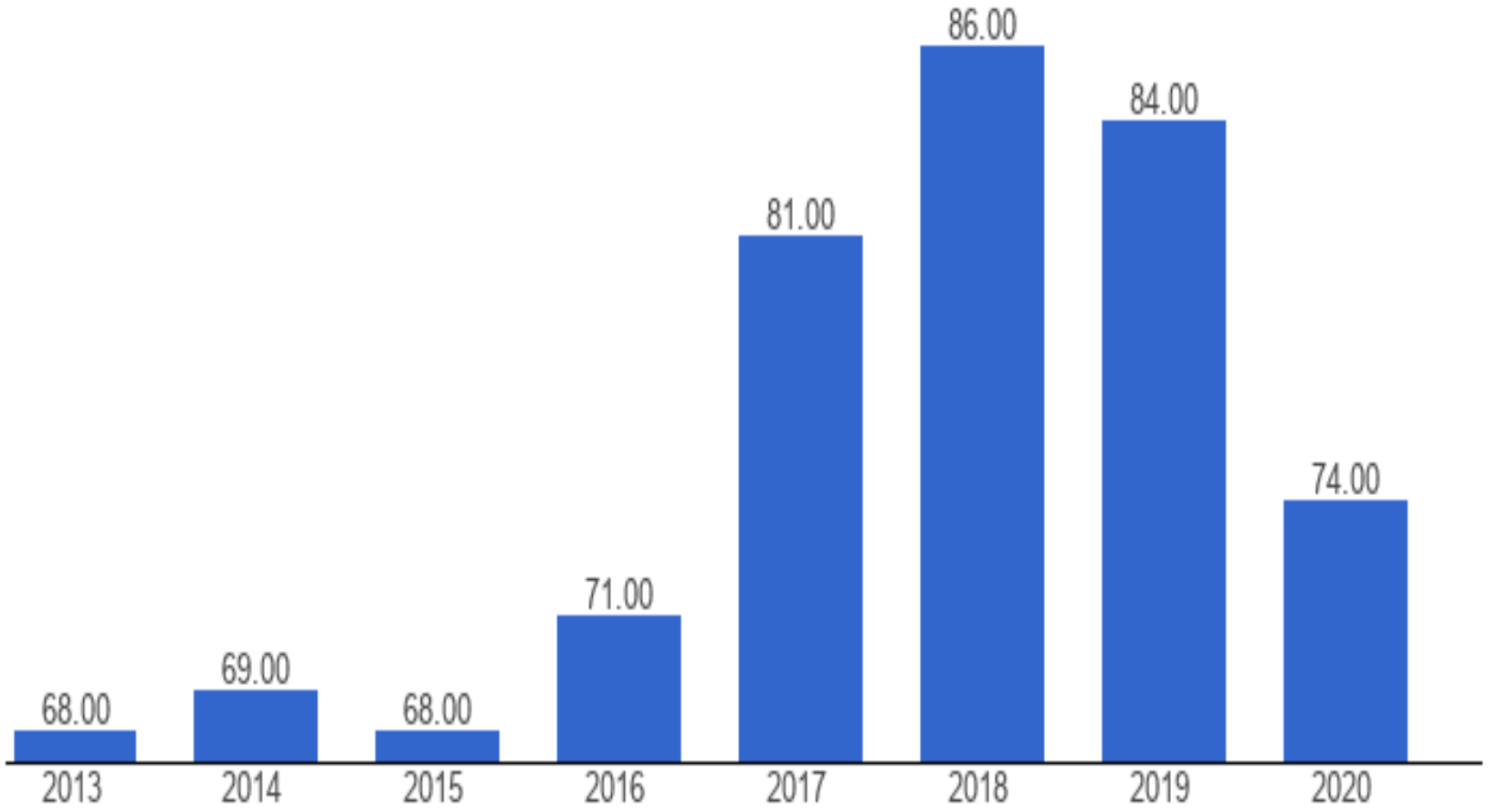
Iraq Hepatitis profile

- Hepatitis B is endemic to Iraq
- **A reported prevalence ranging from approximately 1% in the northern region to 3.5% in the southern region**

Prevalence of hepatitis B virus infection and genotype distribution in some Asian countries

Countries	HBsAg-positive prevalence[16,85-92,96,99,105-108]	HBV genotype distribution[109-118,121,123,125]
Cambodia	4.6%	A: India
		A1 India
		B: China
China	7.18%	B2 southern China
Gaza Strip	3.5%	C: China
India	3.7%	C1 southern China, India
Iraq	0.6%	C2 northern China
Jordan	1.4%	D: Arabian countries and India
Kazakhstan	3.8%	D1 Persian Gulf (Iran, Syria, Turkey), India, Pakistan D2, D3, D4, D9 India
Kuwait	3.5%	
Saudi Arabia	1.5%-2.6%	
Singapore	3.6%	C/D1-CD2 western China
South Korea	4.0%	
United Arab Emirates	2%-7%	
Yemen	5.1%	

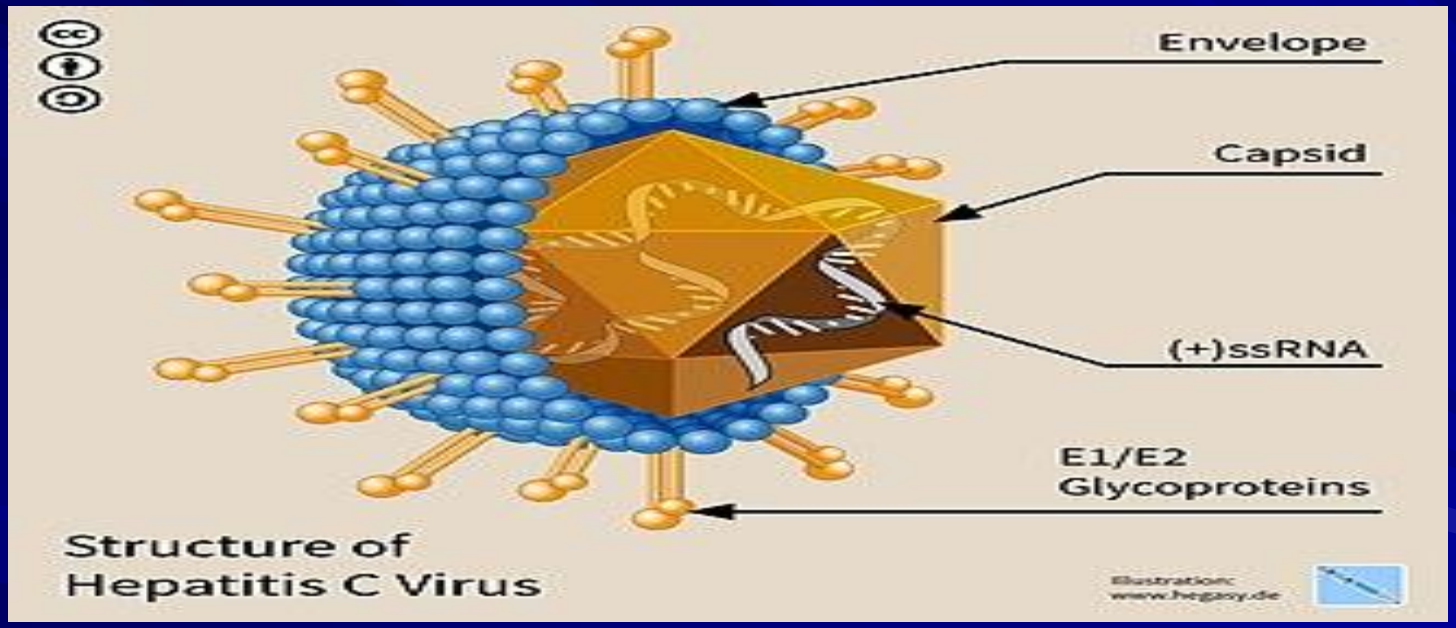
Percent of one-year-old children with Hepatitis B immunization



Hepatitis B Treatment

- Who to treat?
  - Chronic active disease > 6 months
  - Surface Ag +, DNA +, E Ag + or – (if E Ag mutant)
  - ALT > 100, and/or active hepatitis on biopsy
- Goal of treatment
  - Stop viral replication, HBV DNA becomes neg
  - Convert E Ag pos to neg, E AB becomes pos
  - Improvement in histology, prevention of progression to cirrhosis
  - With successful treatment, loss of Surface Ag may occur in 1-2% per year

Hepatitis C


Envelope
Capsid
(+)ssRNA
E1/E2
Glycoproteins
Structure of
Hepatitis C Virus

Acute Hepatitis C: 2020 Case Definition

Clinical Criteria

All hepatitis C virus cases in each classification category should be >36 months of age, unless known to have been exposed non-perinatally.

One or more of the following:

- Jaundice, **OR**
- Peak elevated total bilirubin levels ≥3.0 mg/dL, **OR**
- Peak elevated serum alanine aminotransferase (ALT) level >200 IU/L

AND
The absence of a more likely diagnosis (which may include evidence of acute liver disease due to other causes or advanced liver disease due to pre-existing chronic HCV infection or other causes, such as alcohol exposure, other viral hepatitis, hemochromatosis, etc.)

Laboratory Criteria for Diagnosis

Confirmatory laboratory evidence:

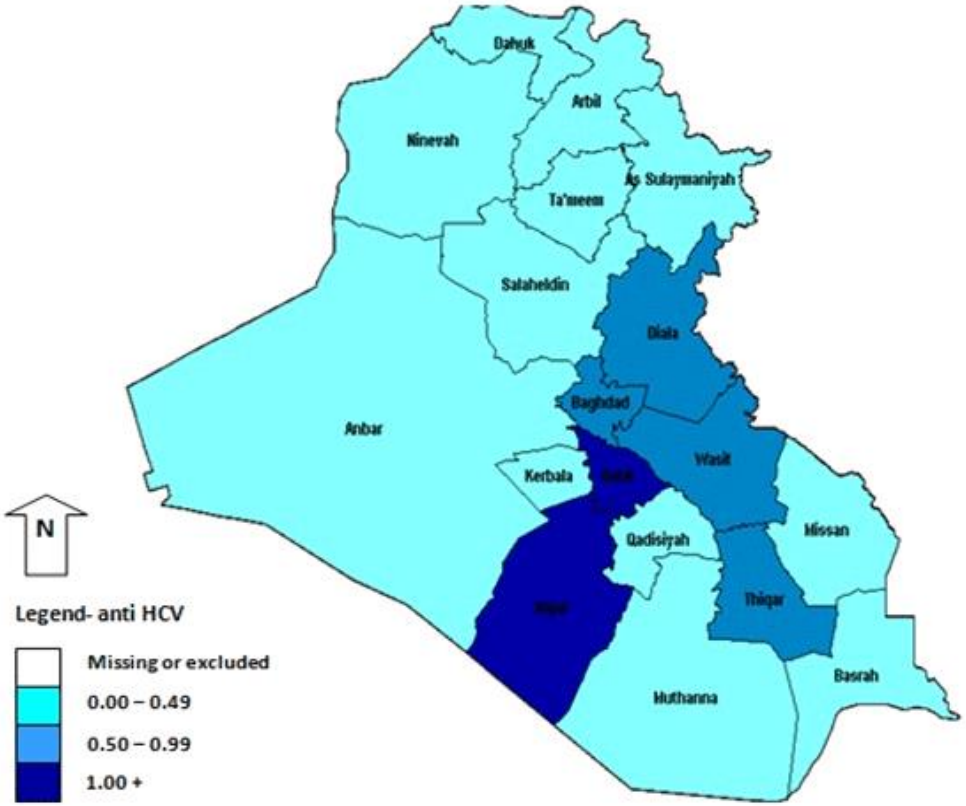
- Positive hepatitis C virus detection test: Nucleic acid test (NAT) for HCV RNA positive (including qualitative, quantitative, or genotype testing), **OR**
- A positive test indicating presence of HCV antigen

Presumptive laboratory evidence:

- A positive test for antibodies to hepatitis C virus (anti-HCV)

- Flaviviridae
- Transmission is primarily percutaneous; sexual and perinatal infection can occur
  - Transfusional HCV risk is now low: 1:1,935,000
  - 50-90% of IV drug abusers have HCV
  - 10% needle stick injuries transmit HCV
  - 4% sexual partners have HCV; Risk of sexual transmission <0.5%/year
  - Perinatal transmission 1-10%

Map diagram showing the anti-HCV antibodies prevalence rate in 18 Iraqi provinces



- high prevalence of HCV infection occur in certain countries such as Egypt, where >20% of the population (as high as 50% in persons born prior to 1960) in some cities is infected.
- 100 million chronic carriers world wide (>3%)
- 4 million with chronic HCV (1.5-2%)
  - 30 thousand new HCV cases per year (incidence decreasing)
  - 10 thousand deaths/year from HCV (incidence increasing)

- Acute hepatitis is rare
  - Fulminant hepatitis is extremely rare
  - 15% can spontaneously resolve infection
  - 85% develop chronic infection
  - HCV RNA becomes + 2 weeks after exposure
  - “incubation” period is 6-7 weeks
  - HCV Ab becomes + by 12 weeks in most

TABLE 339-4 High-Risk Populations for Whom HCV-Infection Screening Is Recommended

All adults aged 18–79 should be screened, a recommendation that supplants the earlier focus on persons born between 1945 and 1965
Persons who have ever used injection drugs
Persons with HIV infection
Hemophiliacs treated with clotting factor concentrates prior to 1987
Persons who have ever undergone long-term hemodialysis
Persons with unexplained elevations of aminotransferase levels
Transfusion or transplantation recipients prior to July 1992
Recipients of blood or organs from a donor found to be positive for hepatitis C
Children born to women with hepatitis C
Health care, public safety, and emergency medical personnel following needle injury or mucosal exposure to HCV-contaminated blood
Sexual partners of persons with hepatitis C infection
Pregnant women

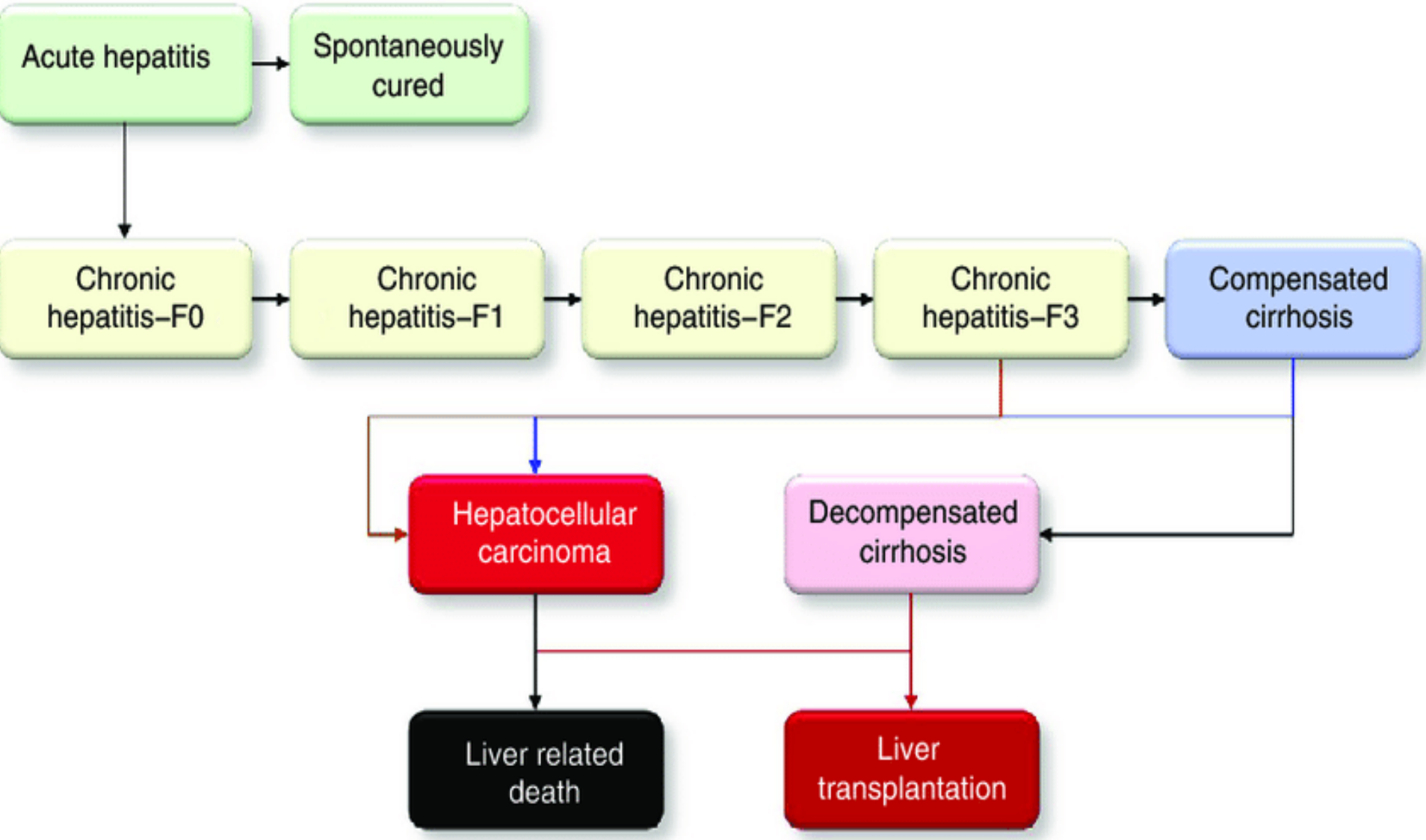
Hepatitis C Prevalence

Risk Factor	Prevalence (%)
Clotting factors < 1987	87
IVDA=IV drug abuse	79
HIV +	25
Increased ALT	15
Hemodialysis	10
> sexual partners	9
History of STD	6
Homosexual	4
General population	1.8
Health care workers	1.0
Healthy blood donors	0.16

HCV Natural History

- 30% with HCV have normal ALT
  - 20% have normal or minimal histology
  - 80% have abnormal histology
  - 15% have advanced histology
  - Disease progression is slower
- Mean progression =
  - Chronic hepatitis 13.7 years
  - Cirrhosis 20.6 years
  - Hepatoma 28.3 years
  - 20% have cirrhosis at 20 years

HCV Natural History



- Other studies
  - Post-transfusion HCV in Italy: 32% have cirrhosis at 7.5 years
  - HCV infected sera given to Irish women: 2% have cirrhosis at 18 years
  - HCV infected RH Ig given to German women: 0% have cirrhosis at 15 years
- Complications of HCV Cirrhosis
  - Decompensation 5% per year
  - Hepatoma 1-4% per year

Hepatitis C

Factors Associated with Disease Progression

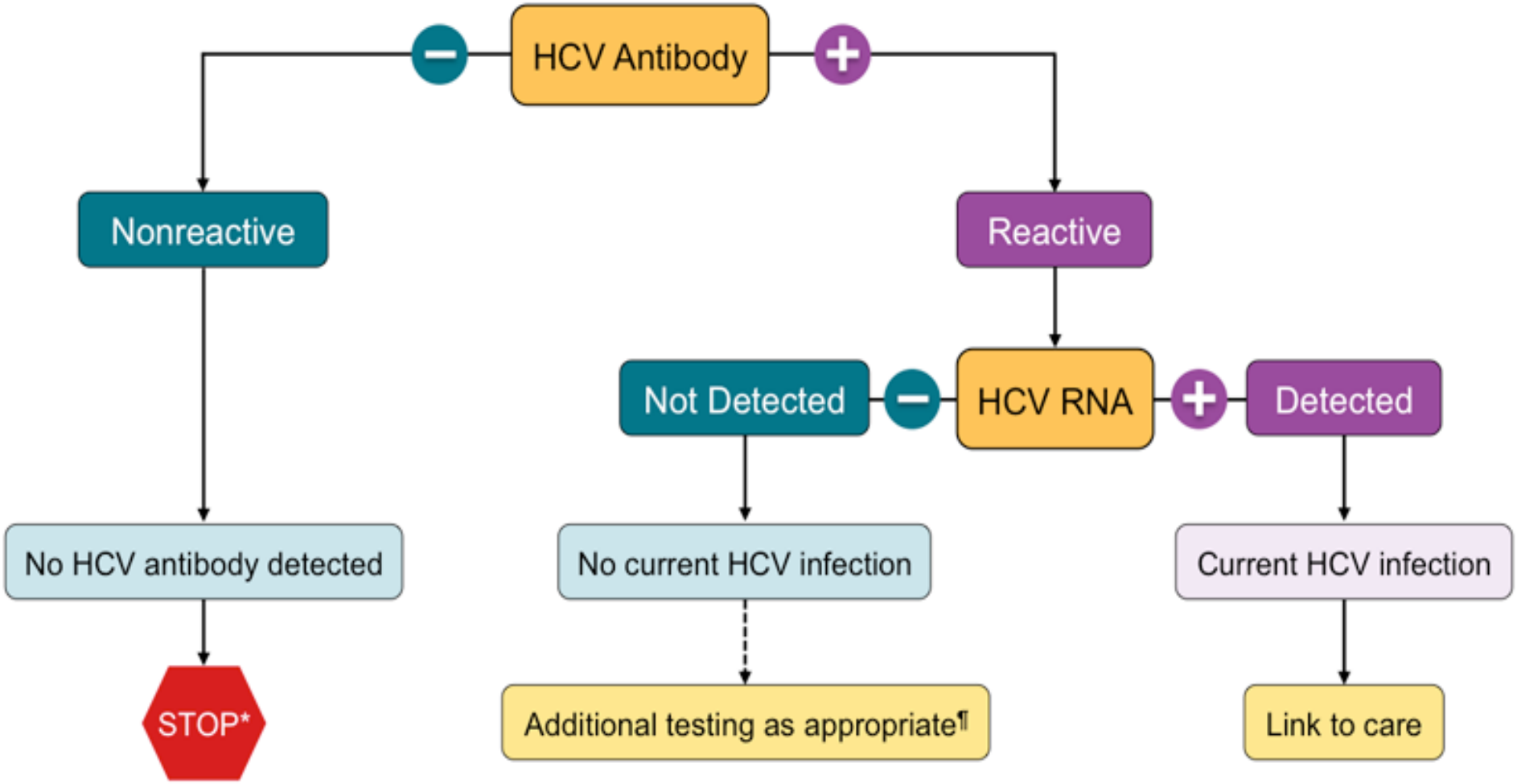
- Age > 40
- Male
- Alcohol > 50 gm/d
- Immunosuppression: HIV, transplant, etc.
- Infection by blood transfusion
- Co-infection with HBV
- Genotype 1

- After acute HCV infection, the likelihood of remaining chronically *infected* approaches 85–90%.
- Although many patients with chronic hepatitis C have no symptoms, cirrhosis may develop in as many as 20% within 10–20 years of acute illness; in some series of cases reported by referral centers, cirrhosis has been reported in as many as 50% of patients with chronic hepatitis C.

- Specific serologic diagnosis of hepatitis C can be made by demonstrating the presence in serum of anti-HCV.

- Assays for HCV RNA are the most sensitive tests for HCV infection and represent the “gold standard” in establishing a diagnosis of hepatitis C.

Recommended Testing Sequence for Identifying Current HCV Infection



* For persons who might have been exposed to HCV within the past 6 months, testing for HCV RNA or follow-up testing for HCV antibody is recommended. For persons who are immunocompromised, testing for HCV RNA can be considered.

¶To differentiate past, resolved HCV infection from biologic false positivity for HCV antibody, testing with another HCV antibody assay can be considered. Repeat HCV RNA testing if the person tested is suspected to have had HCV exposure within the past 6 months or has clinical evidence of HCV disease, or if there is concern regarding the handling or storage of the test specimen.

DIAGNOSIS

Table 1: Diagnostics: acute, cleared, or chronic HCV

Diagnosis:	Prior, cleared HCV infection	Acute HCV infection	Chronic HCV infection
Antibody Test	Positive	Negative; becomes positive within 6 to 24 weeks	Positive
Viral Load Test (HCV RNA)	Undetectable on two tests, performed at least six months apart	Detectable within 1 to 2 weeks, usually very high	Detectable
ALT Test (Alanine Aminotransferase, a liver enzyme)	May be normal, fluctuate, or be persistently raised	May be up to 7 to 10 times above the normal level	May be persistently normal, fluctuate, or be persistently raised

PROPHYLAXIS

- IG is ineffective in preventing hepatitis C and is no longer recommended for post exposure prophylaxis in cases of perinatal, needle stick, or sexual exposure.
- Although prototype vaccines that induce antibodies to HCV envelope proteins have been developed, currently, hepatitis C vaccination is not feasible practically.

PREVENTION

- No Vaccine is available
- Risk factor modification
  - Intravenous drug abuse: treatment with oral methadone
  - Sexual contact: appropriate barrier contraception
  - Avoid blood exposure: Occupational (universal precautions) or other contact
  - Avoid body piercing, sharing razors or receiving a tattoo.
- HAV and HBV vaccine to prevent further progression of liver disease

Delta Hepatitis
Hepatitis D

- Defective RNA virus, requires presence of HBV Surface Ag
- 7500 new cases/year .
  - More common in southern, eastern Europe, Middle East, and South America
- Transmission is similar to HBV

Hepatitis D

Can be contracted 2 ways

	Coinfection	*Superinfection*
Contracted by:	Getting Hepatitis B and D simultaneously	Being chronically infected with hepatitis B and contracting Hepatitis D
Likelihood of becoming chronic:	5% (Unlikely)	70-90% (Likely)

Clinical Features of Hepatitis D

Jaundice	Unknown
Fulminant	2 – 7.5%
Diagnostic tests	
Acute infection	IgM anti-HDV
Chronic infection	IgG anti-HDV, HBsAg +
Immunity	Not applicable
Case-fatality rate	1 – 2%
Chronic infection	Superinfection – 80% Coinfection < 5%

- Diagnosis: HDV Ag, HDV RNA, HDV Ab.
- Acute Hepatitis
  - Co-infection with HBV
    - Fulminant hepatitis more common (34%)
    - Progression to chronic infection is uncommon
  - Super-infection of HBV
    - Acute exacerbation of ongoing hepatitis
    - Chronic liver disease occurs in 90%

PREVENTION

- By vaccinating susceptible persons with hepatitis B vaccine.
- No product is available for immunoprophylaxis to prevent HDV superinfection in persons with chronic HBV infection; for these patients,
- avoidance of percutaneous exposures
- limitation of intimate contact with persons who have HDV infection are recommended.

Hepatitis E

Case definition of HEV

Diário da República, 2.ª série — N.º 82 — 29 de abril de 2014

_Clinical Criteria

Any person with a onset of symptoms compatible with acute viral hepatitis (e.g. fatigue, abdominal pain, loss of appetite, intermittent nausea and vomiting)

AND

At least one of the following three:

a) Fever

b) Jaundice

c) Elevated serum aminotransferase levels

_Epidemiological Criteria

At least one of the following five:

a) Human to human transmission

b) Exposure to a common source of one or more cases

c) Exposure to contaminated food/drinking water

d) Environmental exposure

c) Recent travel to endemic region in less than 3 months

_Laboratory Criteria

At least one of the following two:

a) Detection of hepatitis A virus nucleic acid in plasma or stool

b) Hepatitis A virus specific antibody response

_Case Classification

a) Possible case NA

b) **Probable case**

Any person meeting the clinical criteria and with an epidemiological link

c) **Confirmed case**

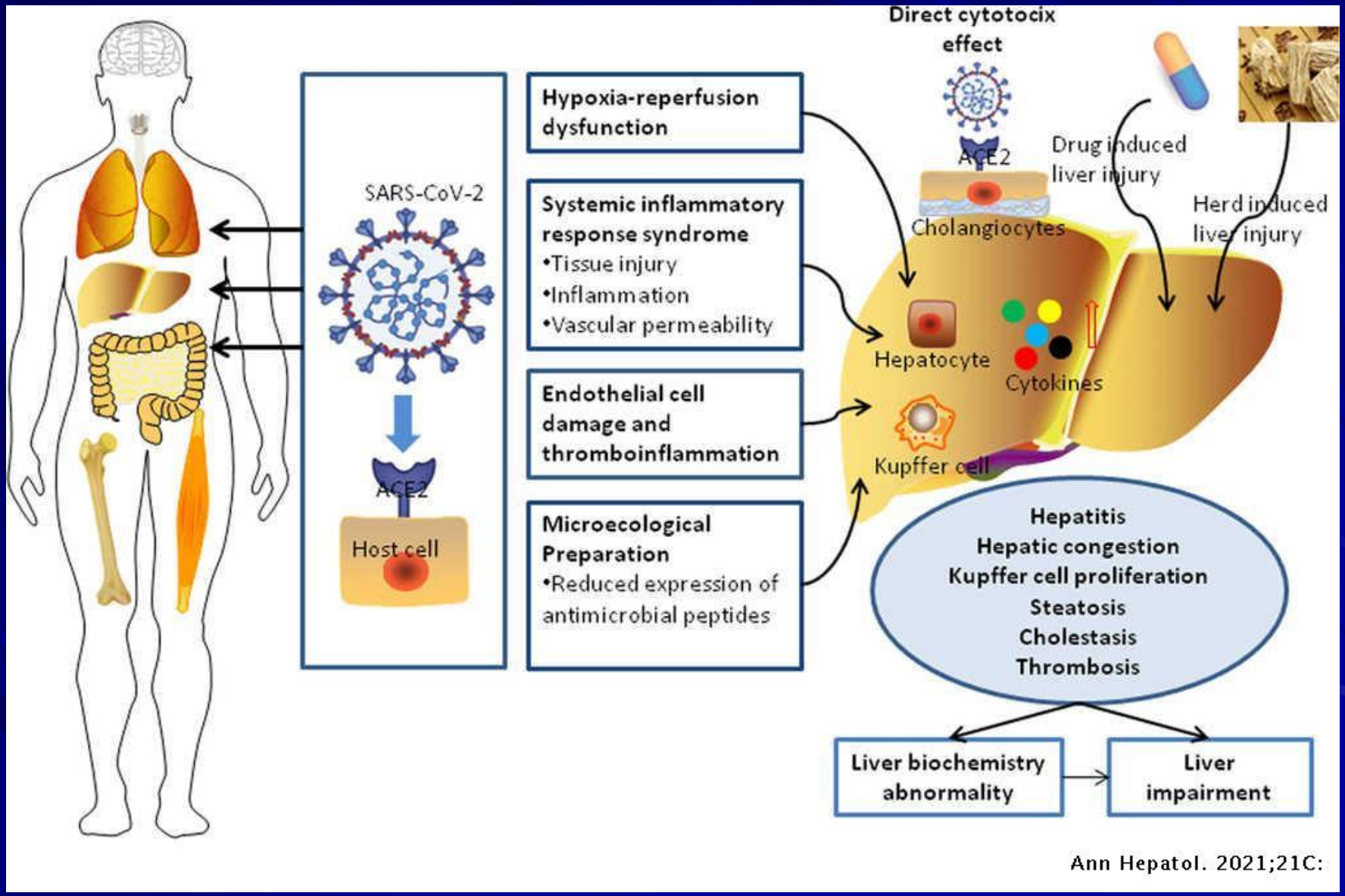
Any person meeting the clinical and the laboratory criteria

- Related to Rubella virus
- Endemic in equatorial regions of world
  - India, Africa, Central America, Asia
  - May account for 50% hepatitis cases in endemic areas
  - Antibodies found in pigs, other mammals

- Fecal oral transmission
  - Contaminated water
  - Household transmission rates are low 1-2%
- Rare except travelers to endemic regions
- Incubation period is 15-60 days (mean 40)
- HEV IgM + at 27-39 days
- 1-4% overall mortality; <u>20-30% mortality if pregnant</u>

- IG derived from HEV endemic populations does not appear to be effective.
- Two safe and effective three-dose (0, 1, and 6 months) recombinant genotype 1 capsid protein vaccines
- A Chinese vaccine,Hecolin, achieved 100% 12-month efficacy and was licensed in China
- A second vaccine developed by Glaxo Smith Kline and the U.S. Army vaccine achieved a 12-month 96% efficacy.
- The Chinese vaccine is available in China but is not FDA approved or available in the United States.

COVID-19 HEPATITIS



Ann Hepatol. 2021;21C:

A 15-year-old male presents after 1 week of progressive fatigue,nausea followed by 2 days of jaundice. No Past history of blood transfusion, Laboratory studies demonstrate serum ALT 225 IU/l, ALP of 330 IU/l and bilirubin of 5.2 mg/dl with normal albumin and INR. A liver ultrasound was normal. A positive value for which of the following tests most likely explains this situation?

- a. Anti-HAV IgM
- b. Anti-HB surface
- c. Anti-HCV
- d. Anti-HDV
- e. Anti-HEV

REFERNCES

- Control of Communicable Diseases Manual, 21st Edition
- 21st Edition***HARRISON'S** PRINCIPLE OF INTERNAL MEDICINE
- **World Hepatitis Day 2023 - One life, One liver(https://www.who.int/news-room/events/detail/2023/07/28/default-calendar/world-hepatitis-day-2023-one-life-one-liver)**

THANK YOU