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VIRAL HEPATITIS

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OBJECTIVES

- ١-The student name hepatotropic and none hepatotropic virals
- ٢- The student explain the “ISSUES COMMON TO ALL FORMS OF VIRAL HEPATITIS”
- ٣- The student know the DDX of viral hepatitis
- ٤- The student know practical issues of each viral hepatitis

VIRAL HEPATITIS

- Major health problem in both developing and developed countries
- Hepatitides A (HAV), B (HBV), C (HCV), D (HDV), and E (HEV) viruses
- Many other viruses (and diseases) can cause hepatitis, usually as ١ component of a multisystem disease. These include HSV, CMV, EBV, VZV, HIV, rubella, adenoviruses, enteroviruses, parvovirus B١٩, and arboviruses

- The hepatotropic viruses cause similar acute clinical illness.
- In most pediatric patients, the acute phase causes no or mild clinical disease.
- Morbidity is related to rare cases of **acute liver failure (ALF)** in susceptible patients, and to the chronic disease state and attendant complications that ٣ of these viruses (hepatitides B, C, and D) can cause

Table 358-1	Features of the Hepatotropic Viruses				
VIROLOGY	**HAV RNA**	**HBV DNA**	**HCV RNA**	**HDV RNA**	**HEV RNA**
Incubation (days)	15-19	60-180	14-160	21-42	21-63
Transmission					
• Parenteral	Rare	Yes	Yes	Yes	No
• Fecal–oral	Yes	No	No	No	Yes
• Sexual	No	Yes	Yes	Yes	No
• Perinatal	No	Yes	Rare	Yes	No
Chronic infection	No	Yes	Yes	Yes	No
Fulminant disease	Rare	Yes	Rare	Yes	Yes

ISSUES COMMON TO ALL FORMS OF VIRAL HEPATITIS

- D Bil⇧
- D Bil ,Total Bil⇧
- Tender hepatomegaly
- lymphadenopathy
- Occasional Splenomegaly
- Extrahepatic manifestations(Arthritis,Rash)
- DTR⇧
- LOC⇩

DDX

- In Neonates:
  - Infections
    - Bacterial(E coli, Listeria,Syphilis)
    - Viral(HSV,CMV,Entrovirus)
  - Metabolic(tyrosinemia)
  - Anatomic(BA, Choledocal cyst, Intrahepatic Cholestasis)

DDX:

- In Childhood:
  - Extrahepatic Obstruction(GB, PSC, Pancreatitis,…)
  - Inflammatory patterns(AIH,JRA, Kawasaki)
  - Malignancy
  - Toxins
  - Metabolic diseases(Wilson, CF)
  - Infections(EBV, Malaria, VZV, CMV,….

BIOCHEMICAL PROFILE

- Cytopathic Damage: ALT,AST ⇧
- Cholestasis: ALKp, GGT, ٥’ NT⇧
- Synthetic function: ALb⇩, PT⇧, Metabolic(BS⇩, Lactic acidosis, Amonia⇧, Drug levels⇧)

BIOCHEMICAL PROFILE(CONTINUE...)

- مقدار ترانس آمینازها شدت بیماری را تعیین نمی کند و پروگنوز را پیش بینی نمی کند. معمولا بعد از چند هفته بهبود می یابند ولی بیلی روبین زودتر نرمال می شود.
- اگر ترانس آمینازها سریعا پایین بیایند ولی بیلی روبین بالا بماند و PT طولانی باشد و پروگنوز بد است.
- شدت بیماری را با پایش عملکرد سنتتیک مانیتور می کنند. پس عملکرد سنتتیک راهنمای مداخلات درمانی در مرحله حاد است.
- اختلال عملکرد کبد به طور خطی پیشرفت نمی کند و باید به طور سریال چک کنیم

Table 358-2 Causes and Differential Diagnosis of Hepatitis in Children

INFECTIOUS

Hepatotropic viruses

- HAV
- HBV
- HCV
- HDV
- HEV
- Hepatitis non–A-E viruses

Systemic infection that can include hepatitis

- Adenovirus
- Arbovirus
- Coxsackievirus
- Cytomegalovirus
- Enterovirus
- Epstein-Barr virus
- "Exotic" viruses (e.g., yellow fever)
- Herpes simplex virus
- Human immunodeficiency virus
- Paramyxovirus
- Rubella
- Varicella zoster

Other

HEMODYNAMIC

Shock
Congestive heart failure
Budd-Chiari syndrome
Other

NONALCOHOLIC FATTY LIVER DISEASE

Idiopathic
Reye syndrome
Other

NONVIRAL LIVER INFECTIONS

Abscess
Amebiasis
Bacterial sepsis
Brucellosis
Fitz-Hugh-Curtis syndrome
Histoplasmosis
Leptospirosis
Tuberculosis
Other

AUTOIMMUNE

Autoimmune hepatitis
Sclerosing cholangitis
Other (e.g., systemic lupus erythematosus, juvenile rheumatoid arthritis)

METABOLIC

α_1-Antitrypsin deficiency
Tyrosinemia
Wilson disease
Other

TOXIC

Iatrogenic or drug induced (e.g., acetaminophen)
Environmental (e.g., pesticides)

ANATOMIC

Choledochal cyst
Biliary atresia
Other

HEPATITIS A

- HAV infection is the most prevalent hepatotropic virus.
- This virus is also responsible for most forms of acute and benign hepatitis;
- Although fulminant hepatic failure can occur, it is rare (<١% of cases in the United States) and occurs more often in adults than in children.
- HAV is highly contagious.

HEPATITIS A

- Transmission is almost always by person to-person contact through the fecal–oral route.
- HAV infection during pregnancy or at the time of delivery does not appear to result in increased complications of pregnancy or clinical disease in the newborn

HEPATITIS A

- The mean incubation period for HAV is approximately ٣ week
- Fecal excretion of the virus starts late in the incubation period, reaches its peak just before the onset of symptoms, and resolves by ٢ wk after the onset of jaundice in older subjects

CLINICAL MANIFESTATIONS

- The typical duration of illness is ٧-١٤ days.
- It is characteristically an acute febrile illness with an abrupt onset of anorexia, nausea, malaise, vomiting, and jaundice.
- Regional lymph nodes and the spleen may be enlarged.

CLINICAL MANIFESTATIONS(CONTINUE…)

- The bone marrow may be moderately hypoplastic, and aplastic anemia has been reported.
- Tissue in the small intestine might show changes in villous structure, and ulceration of the gastrointestinal tract can occur, especially in fatal cases.
- Acute pancreatitis and myocarditis have been reported, though rarely, and nephritis, arthritis, vasculitis, and cryoglobulinemia can result from circulating immune complexes.

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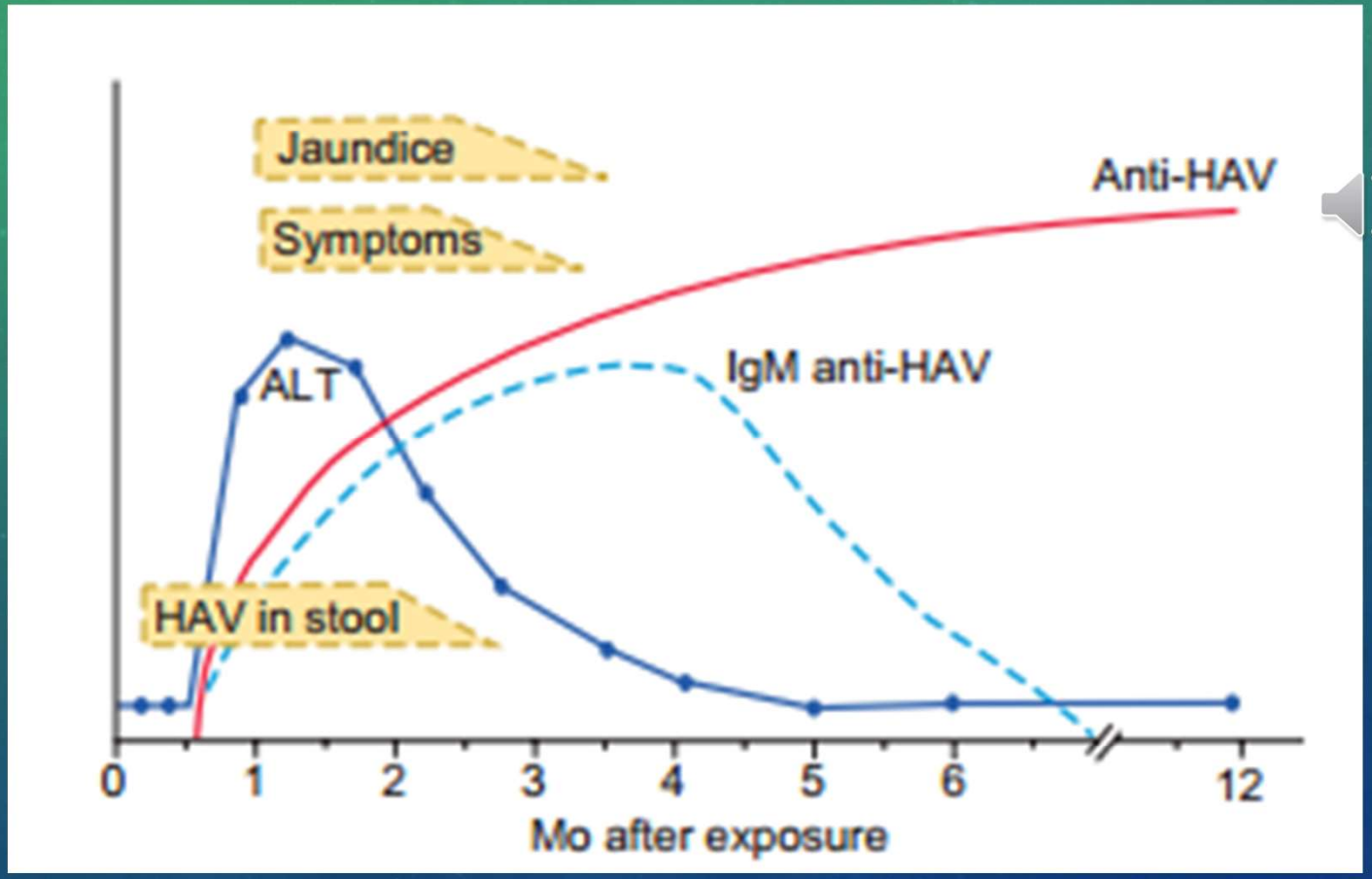
Biliary atresia
Other

DIAGNOSIS

- Antibodies to HAV, specifically, anti-HAV (immunoglobulin [Ig] M) by radioimmunoassay
- Rarely, by identifying viral particles in stool.
- A viral polymerase chain reaction (PCR) assay is available for research use

DIAGNOSIS(CONTINUE...)

- A neutralizing anti-HAV (IgG) is usually detected within ٨ wk of symptom onset and is measured as part of a total anti-HAV in the serum.
- Anti-HAV (IgG) confers long-term protection.
- Rises in serum levels of ALT, AST, bilirubin, alkaline phosphatase, ٥′-nucleotidase, and γ-glutamyl transpeptidase are almost universally found and do not help to differentiate the cause of hepatitis.


Jaundice
Symptoms
Anti-HAV
ALT
IgM anti-HAV
HAV in stool
0
1
2
3
4
5
6
12
Mo after exposure

COMPLICATIONS

- Most patients achieve full recovery
- *ALF* from HAV infection is a rare but not infrequent complication of HAV.
- HAV constitutes up to ۴۰% of all cases of pediatric ALF.
- HAV can also progress to a *prolonged cholestatic syndrome* that waxes and wanes over several months.
- Replase

PREVENTION

- Patients infected with HAV are contagious for ۲ wk before and approximately ۷ days after the onset of jaundice and should be excluded from school, childcare, or work during this period.
- In hospital settings, contact and standard precautions are recommended for ۱ wk after onset of symptoms
- بیماری HAV در مسن ها شدیدتر از کم سن تر هاست و شیرخوارها خفیف تر میگیرند.

VACCINE

- The availability of ٢ inactivated, highly immunogenic, and safe HAV vaccines has had a major impact on the prevention of HAV infection.
- Both vaccines are approved for children older than ١٢ mo.
- They are administered intramuscularly in a ٢-dose schedule, with the ٢nd dose given ٦-١٢ mo after the ١st dose.

Table 358-4 Hepatitis A Virus Prophylaxis

PREEXPOSURE PROPHYLAXIS (TRAVELERS TO ENDEMIC REGIONS)

AGE	EXPECTED EXPOSURE DURATION	DOSE
<1 year of age	<3 months	Ig 0.02 mL/kg
	3-5 months	Ig 0.06 mL/kg
	Long term (>5months)	Ig 0.06 mL/kg at departure and every 5 mo thereafter
≥1 year of age	Healthy host	HAV vaccine
	Immunocompromised host, or one with chronic liver disease or chronic health problems	HAV vaccine and Ig 0.02 mL/kg

POSTEXPOSURE PROPHYLAXIS*

EXPOSURE	RECOMMENDATIONS
≤2 wk since exposure	<1 year-old: Ig 0.02 mL/kg Immunocompromised host, or host with chronic liver disease or chronic health problems: Ig 0.02 mL/kg and HAV vaccine >1 year and healthy host: HAV vaccine, Ig remains optional Sporadic non–household or close contact exposure: prophylaxis not indicated*
>2 wk since exposure	None

*Decision for prophylaxis in nonhousehold contacts should be tailored to individual exposure and risk. Ig, Immunoglubulin.

PASSIVE IMMUNIZATION:

- IG
- تا سه ماه ml/kg ۰,۰۲ ایمنی میدهد
- ۳–۵ ماه ml/kg ۰,۰۶
- بیش از ۵ ماه ml/kg ۰,۰۶ هر ۵ ماه تکرار شود

HEPATITIS B

- HBV has a circular, partially ds DNA genome
- Four genes have been identified: the S (surface), C (core), X, and P (polymer) genes.
- The surface of the virus includes particles designated hepatitis B surface antigen (HBsAg),
- HBeAg serves as a marker of active viral replication and usually correlates with HBV DNA levels. Replication of HBV occurs predominantly in the liver but also occurs in the lymphocytes, spleen, kidney, and pancreas.

EPIDEMIOLOGY

- The areas of highest prevalence of HBV infection are sub-Saharan Africa, China, parts of the Middle East, the Amazon basin, and the Pacific Islands.
- One in ۴ chronic HBV carriers will develop serious sequelae in their lifetime.
- HBV is present in high concentrations in blood, serum, and serous exudates and in moderate concentrations in saliva, vaginal fluid, and semen.
- Efficient transmission occurs through blood exposure and sexual contact.

EPIDEMIOLOGY(CONTINUE…)

- In children, the most important risk factor for acquisition of HBV remains perinatal exposure to an HBsAg-positive mother
- On of HBV remains perinatal exposure to an HBsAg-positive mother. The risk of transmission is greatest if the mother is also HBeAg-positive; up to ۹۰% of these infants become chronically infected if untreated
- Intrauterine infection occurs in ۲/۵% of these infants. In most cases, serologic markers of infection and antigenemia appear ۱-۳ mo after birth, suggesting that transmission occurred at the time of delivery.
-

EPIDEMIOLOGY(CONTINUE…)

- Immunoprophylaxis with hepatitis B immunoglobulin (HBIG) and the HBV immunization, given within ١٢ hr of delivery is very effective in preventing infection and protects > ٩٥% of neonates born to HBsAg-positve mothers.
- HBsAg is inconsistently recovered in human milk of infected mothers.
- Breastfeeding of nonimmunized infants by infected mothers does not confer a greater risk of hepatitis than does formula feeding.

EPIDEMIOLOGY(CONTINUE…)

- The risk of developing **chronic HBV** infection, defined as being positive for HBsAg for longer than ۶ mo, is inversely related to age of acquisition.
- HBV has ۸ genotypes (A-H). A is pandemic, B and C are prevalent in Asia, D is seen in Southern Europe, E in Africa, F in the United States, G in the United States and France, and H in Central America.
- After infection, the incubation period ranges from ۴۵-۱۶۰ days, with a mean of approximately ۱۲۰ days.

EPIDEMIOLOGY(CONTINUE…)

- HBV, unlike the other hepatotropic viruses, is a predominantly noncytopathogenic virus that causes injury mostly by immune-mediated processes.
- The severity of hepatocyte injury reflects the degree of the immune response, with the most complete immune response being associated with the greatest likelihood of viral clearance but also the most severe injury to hepatocytes.
- The most important of these viral antigens may be the nucleocapsid antigens HBcAg and HBeAg. These antigens, in combination with class I major histocompatibility proteins, make the cell a target for cytotoxic T-cell lysis.

EPIDEMIOLOGY(CONTINUE…)

- This fact led to he postulate that HBeAg exposure in utero in infants of chronic carriers likely induces tolerance to the virus once infection occurs postnatally.
- In the absence of this tolerance, the liver is massively attacked by T cells and the patient presents with ALF.
- Immune-mediated mechanisms are also involved in the **extrahepatic conditions** that can be associated with HBV infections. **Circulating immune complexes** containing HBsAg can result in polyarteritis nodosa, membranous or membranoproliferative glomerulonephritis, polymyalgia rheumatica, leukocytoclastic vasculitis, and GuillainBarré syndrome.

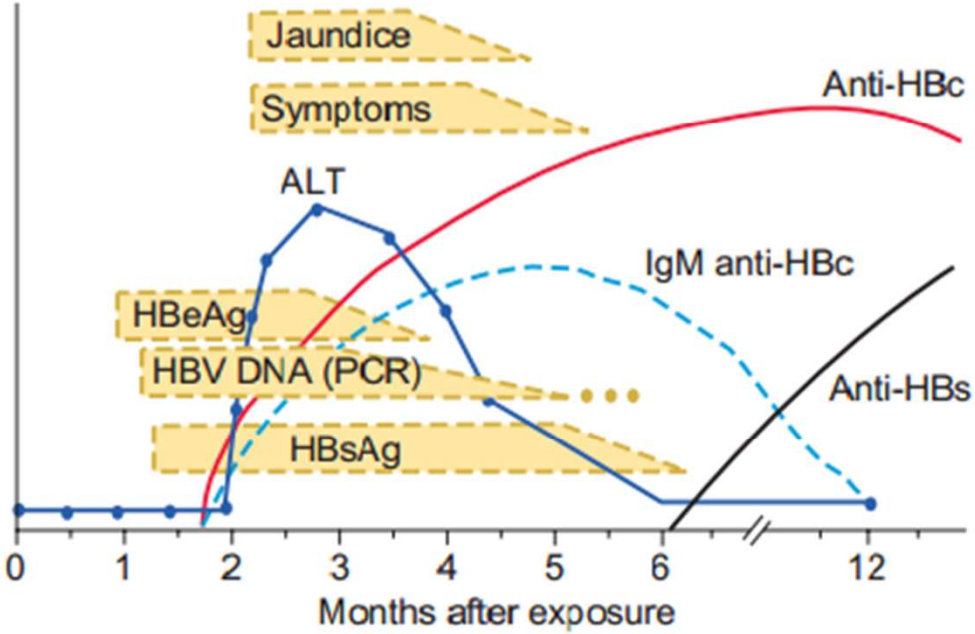


Figure 358-2 The serologic course of acute hepatitis B. *HBc*, hepatitis B core; *HBeAg*, hepatitis B e antigen; *HBs*, hepatitis B surface; *HBsAg*, hepatitis B surface antigen; *HBV*, hepatitis B virus; *PCR*, polymerase chain reaction. (*From Goldman L, Ausiello D:* Cecil textbook of medicine, *ed 22, Philadelphia, 2004, WB Saunders, p 914.*)

CLINICAL MANIFESTATIONS

- The usual acute symptomatic episode is similar to that of HAV and HCV infections but may be more severe and is more likely to include involvement of skin and joints
- The first biochemical evidence of HBV infection is elevation of serum ALT levels, which begin to rise just before development of fatigue, anorexia, and malaise

CLINICAL MANIFESTATIONS(CONTINUE…)

- The illness is preceded in a few children by a serum sickness–like prodrome marked by arthralgia or skin lesions, including urticarial, purpuric, macular, or maculopapular rashes
- Other extrahepatic conditions associated with HBV infections in children include polyarteritis nodosa, glomerulonephritis, and aplastic anemia

CLINICAL MANIFESTATIONS

- Jaundice is present in approximately ۲۵% of acutely infected patients and usually begins approximately ۸ wk after exposure and lasts approximately ۴ wk.

- The percentage of children in whom clinical evidence of hepatitis develops is higher for HBV than for HAV, and the rate of ALF is also greater.

CLINICAL MANIFESTATIONS

- Chronic HBV infection has ٣ identified phases:
- immune tolerant
- immune active
- and inactive
- Most children fall in the immune-tolerant phase, against which no effective therapy has been developed.
- Most treatments target the immune active phase of the disease, characterized by active inflammation, elevated ALT/AST levels, and progressive fibrosis.

DIAGNOSIS

- Routine screening for HBV infection requires assay of multiple serologic markers (HBsAg, anti-HBc, anti-HBs)
- Only anti-HBs is present in persons immunized with hepatitis B vaccine, whereas both anti-HBs and antiHBc are detected in persons with resolved infection
- During recovery from acute infection, because HBsAg levels fall before symptoms wane, IgM antibody to HBcAg (anti-HBc IgM) might be the only marker of acute infection.
- HBeAg is present in active acute or chronic infection and is a marker of infectivity.
- The development of anti-HBe, termed seroconversion, marks improvement and is a goal of therapy in chronically infected patients.

COMPLICATIONS

- **Acute liver failure** with coagulopathy, encephalopathy, and cerebral edema occurs more commonly with HBV than the other hepatotropic viruses.
- The risk of ALF is further increased when there is coinfection or superinfection with HDV and in an immunosuppressed host.
- Chronic hepatitis
- Hepatocellular carcinoma
- Membranous glomerulonephritis

TREATMENT

- *Interferon-α۲b (IFN-α۲b)*

Interferon (IFN) use is limited by its subcutaneous administration, treatment duration of ۲۴ wk, and possible side effects (flu-like symptoms, marrow suppression, depression, retinal changes, autoimmune disorders)

- *Lamivudine*

in children older than age ۲ yr, its use for ۵۲ wk resulted in HBeAg clearance in ۳۴% of patients with an
ALT > ۲ times normal; ۸۸% remained in remission at ۱ yr.

Combination therapy in children using IFN and lamivudine did not seem to improve the rates of response in most series.

TREATMENT

- *Adefovir* (a purine analog that inhibits viral replication) is approved for use in children older than ١٢ yr of age
- *Peginterferon-α٢(Tenofovir, Entecavir)* is currently approved for use in children older than age ١٦ yr.
- Patients most likely to respond to currently available drugs have low serum HBV DNA titers, are HBeAg-positive, have active hepatic inflammation (ALT greater than twice the upper limit of
normal for at least ٦ mo), and recently acquired disease

PREVENTION

- HBV is not spread by breastfeeding, kissing, hugging, or sharing water or utensils.
- HBIG is indicated only for specific postexposure circumstances and provides only temporary protection (٣-٦ months). It plays a pivotal role in preventing perinatal transmission when administered within ١٢ hr of birth.

- integrate HBV vaccination in a harmonized childhood vaccination. Two single-antigen vaccines (Recombivax HB and Engerix-B) are approved for children and are the only preparations approved for infants younger than age ۶ months.
- Seropositivity is >۹۵% with all vaccines, achieved after the ۲nd dose in most patients. The ۳rd dose serves as a booster and may have an effect on maintaining long-term immunity.

- In immunosuppressed patients and infants whose birthweight is <٢٬٠٠٠ g, a ٤th dose is recommended, as is checking for seroconversion. Despite declines in the anti-HBs titer in time, most healthy vaccinated persons remain protected against HBV infection.
- Preterm infants weighing <٢٬٠٠٠ g at birth and born to HBsAg-*negative* mothers should have their initial dose delayed until ١ mo of age or before hospital discharge

Table 358-5 Indications and Dosing Schedule for Hepatitis B Vaccine and Hepatitis B Immunoglobulin

	VACCINE DOSE		
	RECOMBIVAX HB (µg)	**ENGERIX-B (µg)**	**SCHEDULE**
UNIVERSAL PROPHYLAXIS			
Infants of HBsAg(–) women	5	10	Birth, 1-2, 6-18 mo
Children and adolescents (11-19 yr old)	5	10	0, 1, and 6 mo
POSTEXPOSURE PROPHYLAXIS IN SUSCEPTIBLE INDIVIDUALS			
Contact with HBsAg(+) Source			
Infants of HBsAg(+) women	5	10	Birth* (+HBIG†), 1 and 6 mo
Intimate or Identifiable Blood Exposure			
0-19 yr old	5	10	Exposure (+HBIG†), 1 and 6 mo
>19 yr old	10	20	Exposure (+HBIG†), 1 and 6 mo
Household			
0-19 yr old	5	10	Exposure, 1 and 6 mo
>19 yr old	10	20	Exposure, 1 and 6 mo
Casual	None	None	None
Immunocompromised‡	40	40	Exposure (+HBIG†), 1 and 6 mo
Contact with Unknown HBsAg Status; Intimate or Identifiable Blood Exposure			
>19 yr old	10	20	Exposure, 1 and 6 mo
Immunocompromised‡	40	40	Exposure (+HBIG†), 1 and 6 mo

*Both HBIG and vaccine should be administered within 12 hr of the infant's birth and within 24 hr of identifiable blood exposure. HBIG can be given up to 14 days after sexual exposure.

†HBIG dose: 0.5 µL for newborns of HBsAg-positive mothers, and 0.0 6 µL/kg for all others when recommended.

‡Seroconversion status of immunocompromised patients should be checked 1-2 mo after the last dose of vaccine, and yearly thereafter. Booster doses of vaccine should be administered if the anti-HBs titer is <10 mIU/mL. Nonresponsive patients should be considered at high risk for HBV acquisition and counseled about preventive measures.

HBs, hepatitis B surface; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus.

- Postvaccination testing for HBsAg and anti-HBs should be done at ٩-١٨ mo.

HCV

- HCV is a single-stranded RNA virus, classified as a separate genus within the Flaviviridae family, with marked genetic heterogeneity. HCV infection is the most common cause of chronic liver disease in adults and causes
- Approximately ۸۵% of infected adults remain chronically infected.
- Perinatal transmission occurs in up to ۵% of infants born to viremic mothers.
- HIV coinfection and high viremia titers (HCV RNA-positive) in the mother can increase the transmission rate to ۲۰%. The incubation period is ۷-۹ wk

PATHOGENESIS

- HCV appears to cause injury primarily by cytopathic mechanisms, but immune-mediated injury can also occur.

CLINICAL MANIFESTATIONS

- Acute HCV infection tends to be mild and insidious in onset (ALF rarely occurs.)
- Chronic HCV infection is also clinically silent until a complication develops. Serum aminotransferase levels fluctuate and are sometimes normal
- Approximately ٢٥% of infected patients ultimately progress to cirrhosis, liver failure, and, occasionally, primary hepatocellular carcinoma (HCC) within ٢٠-٣٠ yr of the acute infection.
- Chronic HCV infection can be associated with small vessel vasculitis and is a common cause of essential mixed cryoglobulinemia.

- Other extrahepatic manifestations, predominantly seen in adults, include cutaneous vasculitis, peripheral neuropathy, cerebritis, membranoproliferative glomerulonephritis, and nephrotic syndrome.
- Antibodies to smooth muscle, antinuclear antibodies, and low thyroid hormone levels may also be present.

DIAGNOSIS

- The most widely used **serologic test** is the third-generation enzyme immunoassay to detect anti-HCV.
- The predictive value of this assay is greatest in high-risk populations, but the false-positive rate can be as high as ۵۰-۶۰% in low-risk populations.

DIAGNOSIS(CONTINUE…)

- False-negative results also occur because antibodies remain negative for as long as ١-٣ mo after clinical onset of illness.
- Anti-HCV is not a protective antibody and does not confer immunity; it is usually present simultaneously with the virus.
- The most commonly used **virologic assay** for HCV is a PCR assay, which permits detection of small amounts of **HCV RNA** in serum and tissue samples within days of infection.

DIAGNOSIS(CONTINUE…)

- The *qualitative* PCR detection is especially useful in patients with recent or perinatal infection, hypogammaglobulinemia, or immunosuppression and is very sensitive.
- The *quantitative* PCR aids in identifying patients who are likely to respond to therapy and in monitoring response to therapy.

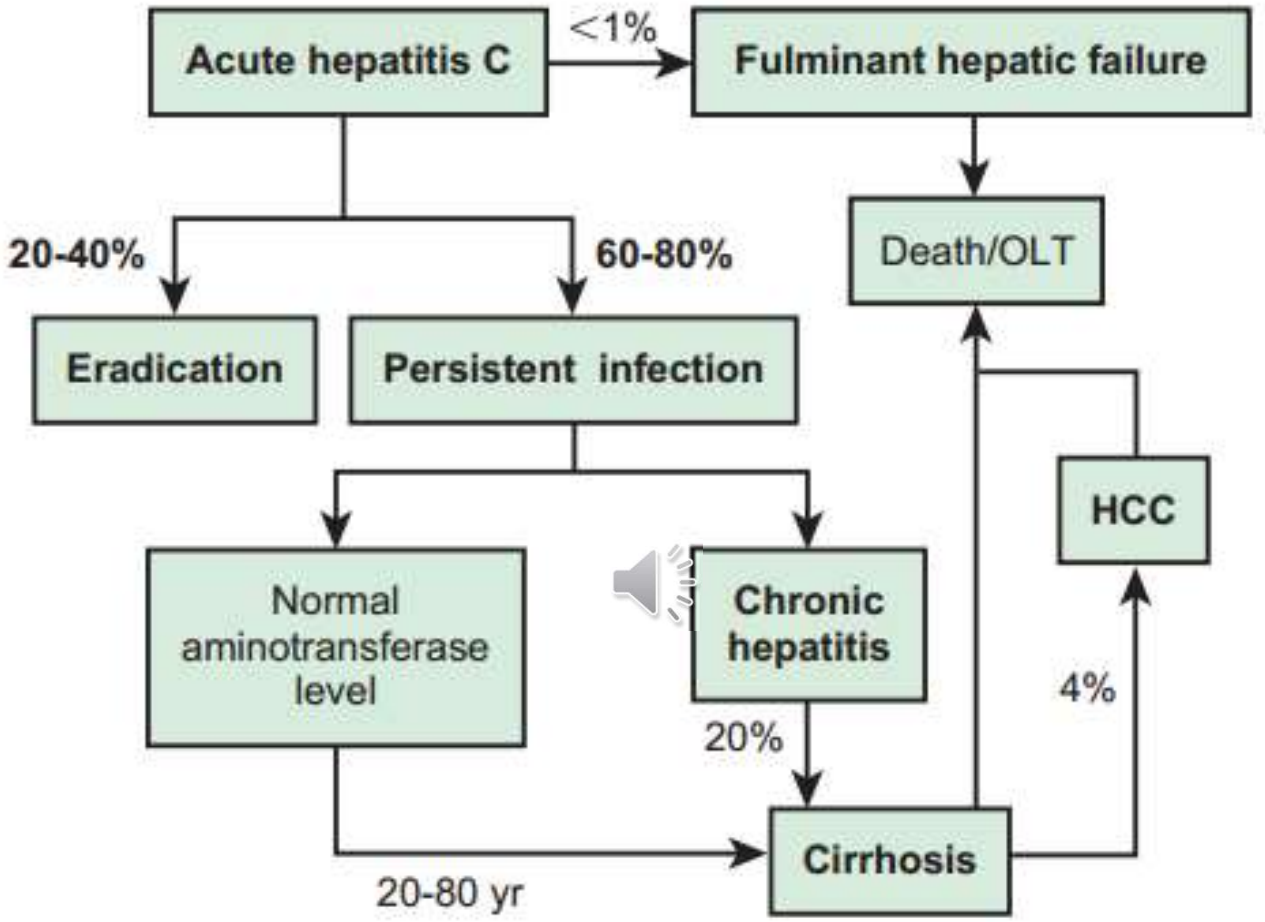


Figure 358-5 Natural history of hepatitis C virus infection. *HCC*, hepatocellular carcinoma; *OLT*, orthotopic liver transplant. *(From Hochman JA, Balistreri WF: Chronic viral hepatitis: always be current!* Pediatr Rev *24:399–410, 2003.)*

SCREENING

- **Screening** for HCV should include all patients with the following risk factors: history of illegal drug use (even if only once), receiving clotting factors made before ۱۹۸۷ (when inactivation procedures were introduced) or blood products before ۱۹۹۲, hemodialysis, idiopathic liver disease, and children born to HCV-infected women (qualitative PCR in infancy and anti-HCV after ۱۲-۱۸ mo of age).
- Routine screening of all *pregnant women* is not recommended.

DIAGNOSIS

- Aminotransferase levels typically fluctuate during HCV infection and do not correlate with the degree of liver fibrosis.
- A liver biopsy is the only means to assess the presence and extent of hepatic fibrosis, outside of overt signs of chronic liver disease.
- A liver biopsy is indicated only before starting any treatment and to rule out other causes of overt liver disease.

COMPLICATIONS

- The risk of ALF caused by HCV is low, but the risk of **chronic hepatitis** is the highest of all the hepatotropic viruses.
- In adults, risk factors for progression to hepatic fibrosis include older age, obesity, male sex, and even moderate alcohol ingestion (two ١ oz drinks per day).

TREATMENT

- Treatment should be considered for patients with evidence of advanced fibrosis or injury on liver biopsy.
- The currently approved treatment consists of ۴۸ wk of peginterferon and ribavirin (therapy should be stopped if still detectable on viral PCR at ۲۴ wk of therapy).
- Factors associated with a higher likelihood of response are age younger than ۱۲ yr, genotypes ۲ and ۳, and, in patients with genotype ۱b, an RNA titer of <۲ million copies/mL of blood, and viral response (PCR at weeks ۴ and ۱۲ of treatment).

TREATMENT

- The goal of treatment is to achieve a sustained viral response (SVR), as defined by the absence of viremia ۶ mo after stopping the medications; SVR is associated with improved histology and decreased risk of morbidities.
- Peginterferon (Schering), IFN-α۲b, and ribavirin are approved by the FDA for use in children older than ۳ yr of age with HCV hepatitis.

TREATMENT(CONTINUE…)

- Studies of IFN monotherapy in children demonstrated a higher SVR than in adults, with better compliance and fewer side effects.
- Treatment should be considered for all children infected with genotypes ۲ and ۳, because they have an ۸۰-۹۰% response rate to therapy with peginterferon and ribavirin.

PREVENTION

- No vaccine is yet available to prevent HCV,
- Once HCV infection is identified, patients should be screened yearly with a liver ultrasound and serum α-fetoprotein for HCC
- Vaccinating the affected patient against HAV and HBV will prevent superinfection with these viruses and the increased risk of developing severe liver failure.

PROGNOSIS

- Viral titers should be checked yearly to document spontaneous remission

HEPATITIS D

- The۳۶ nm diameter virus is incapable of making its own coat protein; itsouter coat is composed of excess HBsAg from HB
- HDV can cause an infection at the same time as the initial HBV infection (coinfection), or HDV can infect a person who is already infected with HBV (superinfection).
- HDV infections are uncommon in children in the United States but must be considered when ALF occurs.
- In contrast to HBV, HDV causes injury directly by cytopathic mechanisms.

HEPATITIS D

- PCR assays for viral RNA are available as research tools Because HDV replication cannot occur without hepatitis B coinfection, immunization against HBV also prevents HDV infection. Hepatitis B vaccines and HBIG are used for the same indications as for hepatitis B alone

HEPATITIS E

- The highest prevalence of HEV infection has been reported in the Indian subcontinent, the Middle East, Southeast Asia, and Mexico, especially in areas with poor sanitation.
- Transmission is fecal–oral (often waterborne) and is associated with shedding of ٢٧-٣٤ nm particles in the stool
- The mean incubation period is approximately ٤٠ days (range: ١٥-٦٠ days).
- HEV appears to act as a cytopathic virus.

HEPATITIS E

- As with HAV, chronic illness does not occur. In addition to often causing a more severe episode than HAV, HEV tends to affect older patients, with a peak age between ١٥ and ٣٤ yr.
- HEV is a major pathogen in pregnant women, in whom it causes ALF with a high fatality incidence

HEPATITIS E

- **Diagnosis**
  IgM antibody to viral antigen becomes positive after approximately ١ wk of illness.

- **Prevention**
  A recombinant hepatitis E vaccine is highly effective in adults.
  No evidence suggests that Ig is effective in preventing HEV infections.

CONCLUSION:

- هپاتیت های ویرال از مباحث شایع و مهم پزشکی در کشور ما هستند.
- از بین آنها هپاتیت A را باید کاملا فراگیریم ولی در مور هپاتیت B و C بیشتر مبحث پیشگیری و تشخیص کاربردی است.

REFERENCES:

- Nelson Textbook of Pediatrics٢٠١٩

Thanks