

# HEPATITIS VIRUSES

# What is Viral Hepatitis ?

- Viral hepatitis is a systemic disease with primary inflammation of the liver by any one of a heterogenous group of hepatotropic viruses

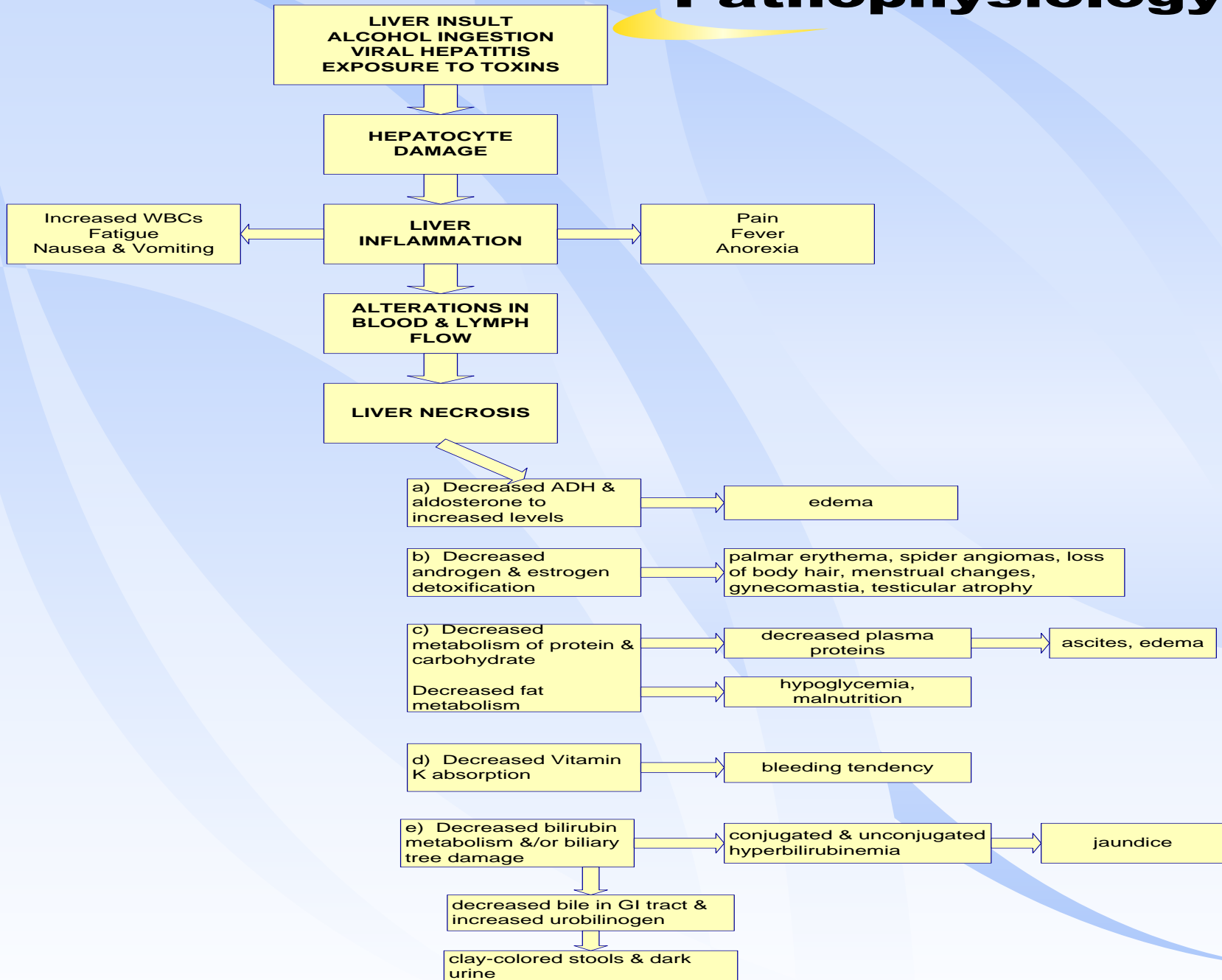
# Pathophysiology

>pathophysiologic features are similar regardless of the cause

>hepatocytes undergo pathologic changes induced by the body's immune response to the virus

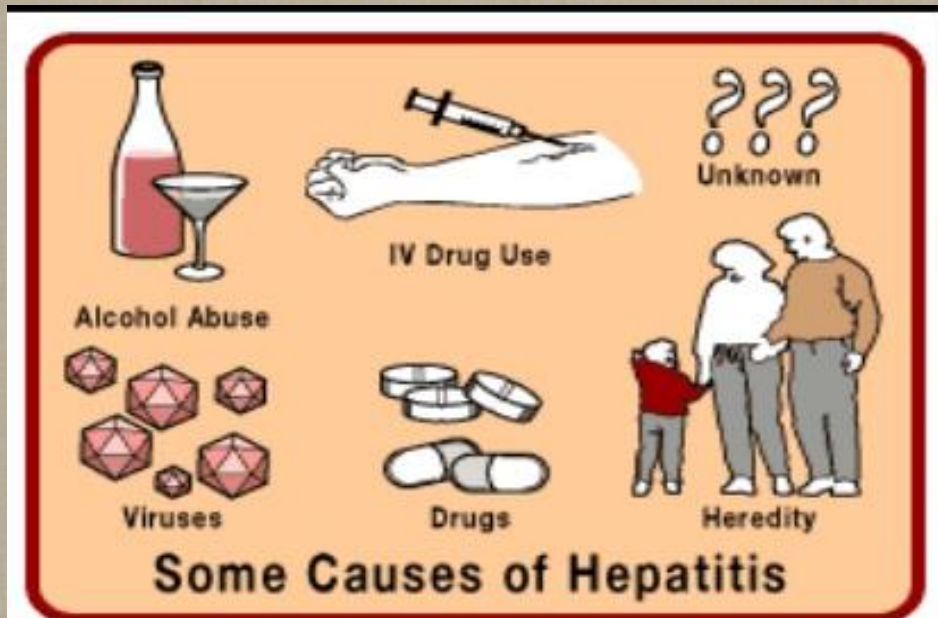
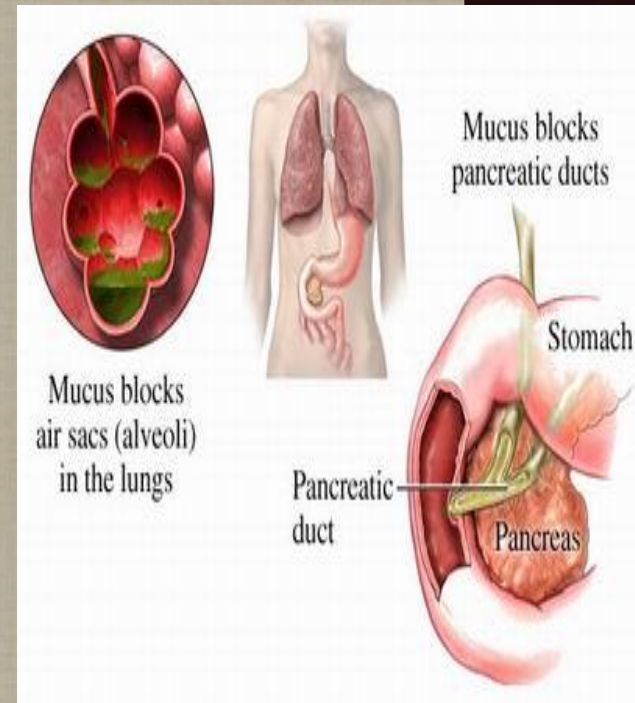


# Pathophysiology



# CAUSES

- Autoimmune hepatitis
- Infections from viruses, bacteria, or parasites
- Certain chemicals or poisonous organism
- Liver damage from alcohol, poisonous mushrooms, or other poisons
- Medications: Acetaminophen
- Inherited disorders : cystic fibrosis , hemochromatosis, Wilson's disease





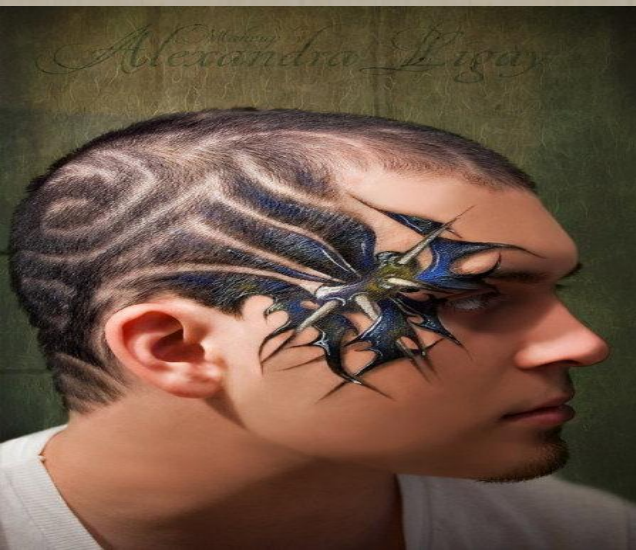
# RISK FACTORS

- Intravenous drug use
- Overdosing on acetaminophen
- Engaging in risky sexual behaviors
- Eating contaminated foods
- Traveling to an area where certain diseases are common
- Living in a nursing home or rehabilitation center
- Having a family member who recently had hepatitis A



## CONT..

- Using or abusing alcohol
- Being an organ transplant recipient
- Having HIV or AIDS
- Having received a blood transfusion
- Being a newborn of a mother with hepatitis B or C
- Being a health care worker, because of blood contact
- Receiving a tattoo
- Receiving contaminated blood, sweat, tears, saliva, semen, vaginal secretions, menstrual blood and breast milk.





# PREVENTION

## 1. To prevent from Viral Hepatitis

- Vaccination
- Immune Globulin for Traveling Abroad
- Hand Washing
- Avoid Used Needles
- Protected Sex
- Avoid Sharing Certain Personal Items
- Wear Gloves When Handling Body Fluids
- Avoid Contaminated Water and Food





# Hepatitis virus

**Hepatitis A virus**

**Hepatitis B virus**

**Hepatitis C virus**

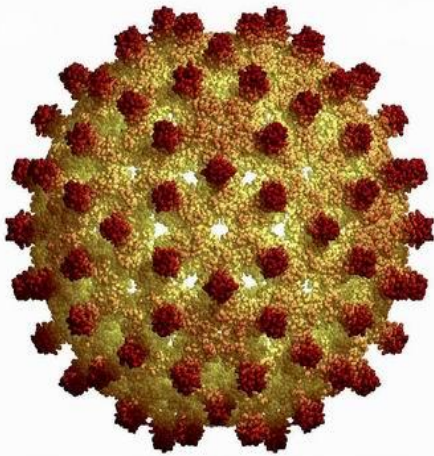
**Hepatitis D virus**

**Hepatitis E virus**

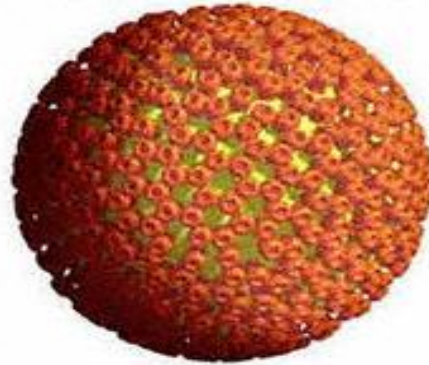
**Hepatitis G virus**

# VIRAL HEPATITIS

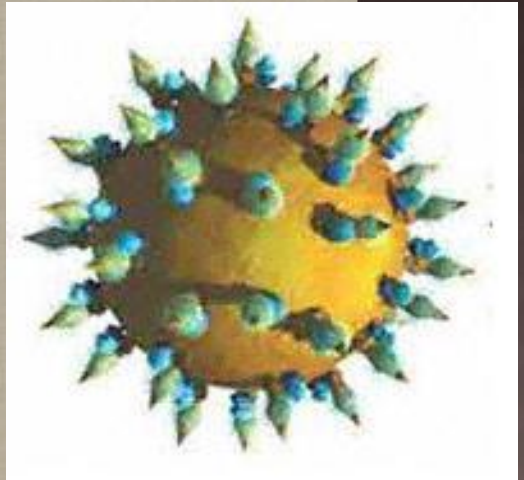
Hepatitis caused by viruses:



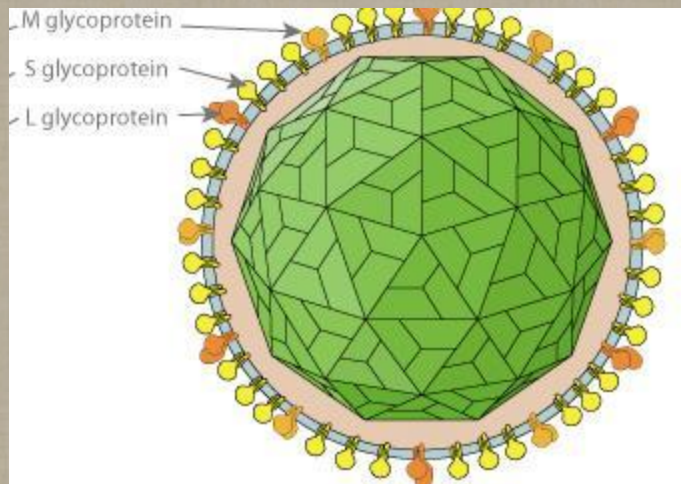
Hepatitis A virus (HAV)



Hepatitis B Virus (HBV)

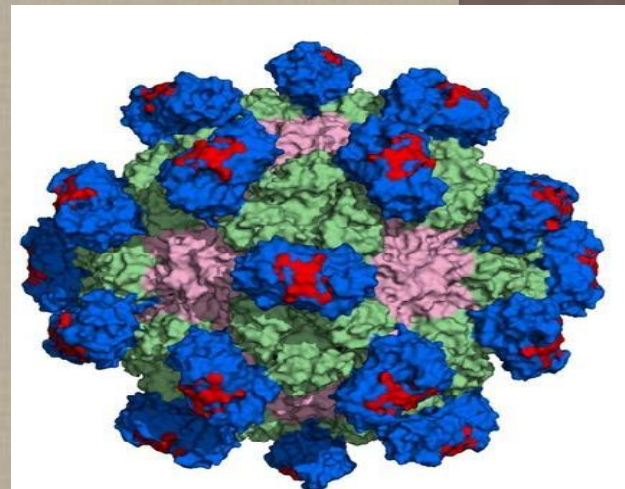


Hepatitis C Virus (HCV)



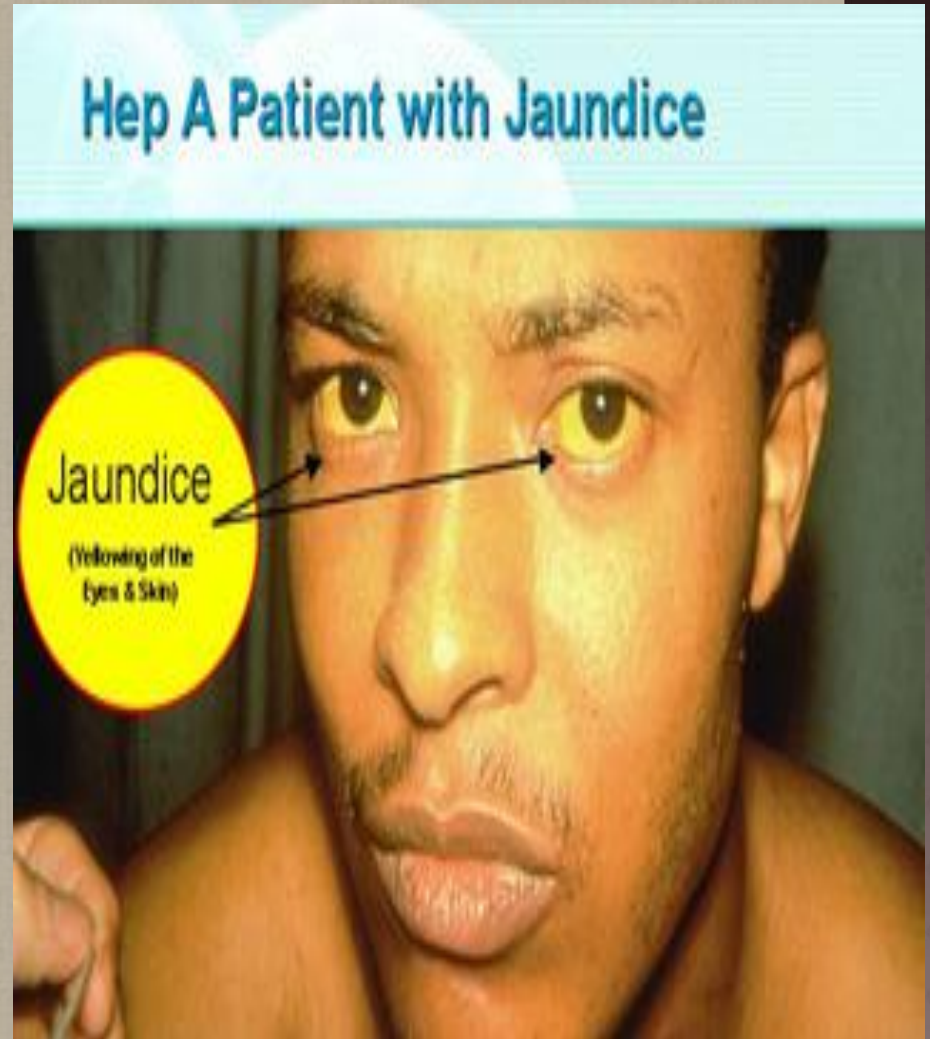
Hepatitis D Virus (HDV)

Hepatitis E Virus (HEV)



# HEPATITIS A

- Called HAV
- Infected Food water human waste ,
- Anal -oral contact during sex .





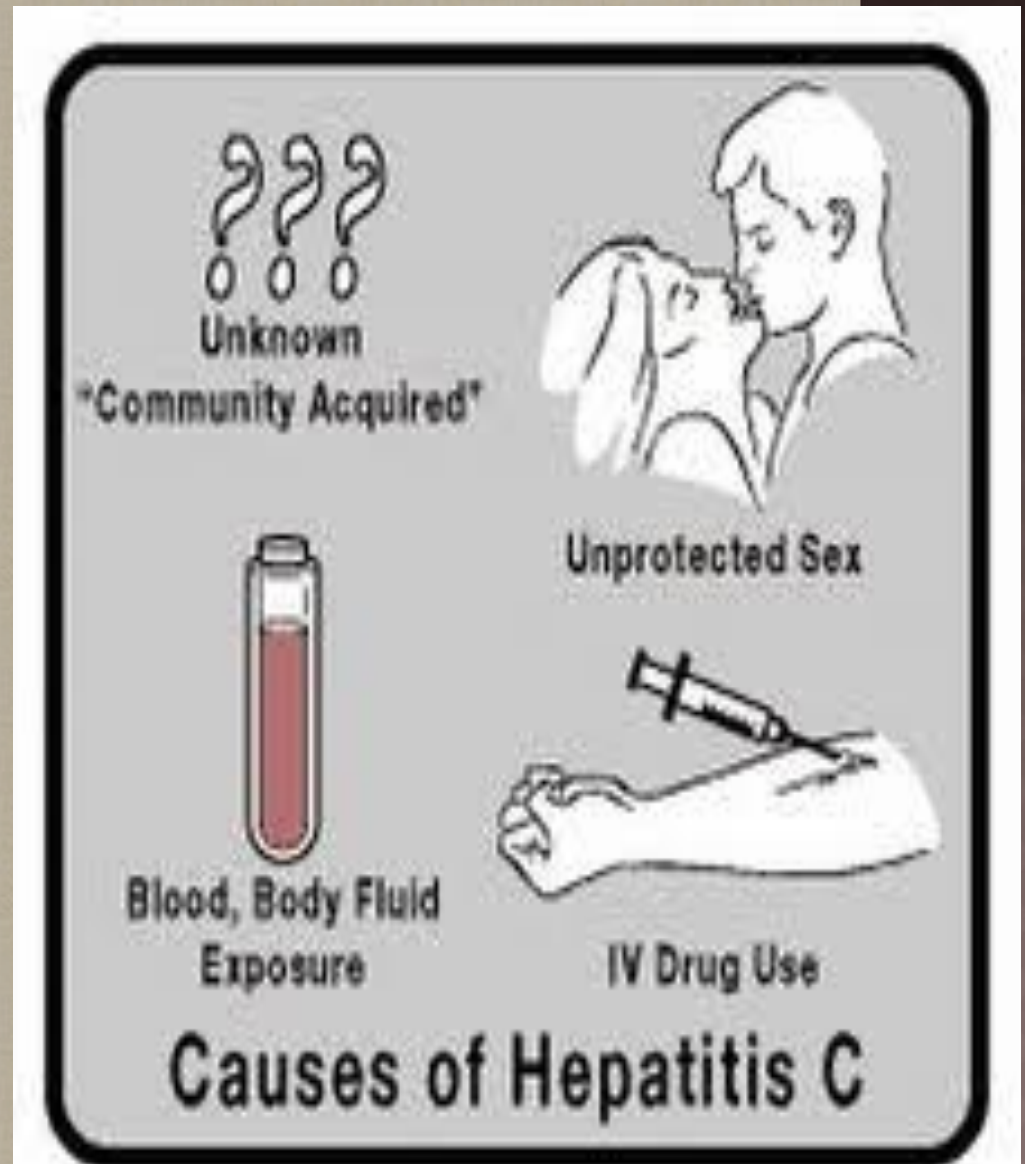
# HEPATITIS B:

- Called HBV
- STD.
- Injected blood sharing of needles unprotected sex ,tattoo.



# HEPATITIS C:

- Called HCV.
- Direct contact with blood.
- Unprotected sex.



# HEPATITIS C AND LIVER CANCER

- Cirrhosis [liver scaring ]
- Risk factor
- Older
- Male gender
- Heavy alcohol used.



**IF HEP C WAS ATTACKING YOUR FACE INSTEAD OF YOUR LIVER, YOU'D DO SOMETHING ABOUT IT.**

**READY TO FIGHT BACK?**

YOU'LL NOW BE STRONGER THAN YOU ARE TODAY TO STOP THE DAMAGE HEP C IS DOING TO YOUR LIVER. Talk to your doctor about antiviral treatment. Proper treatment should result in a better than 90% chance of reducing the virus. There is no permanent cure. Antiviral treatment may carry some or no side effects. See HepCSource.com, then call to your doctor to find out if treatment is right for you. And help you. Hep C MEDICINE.

HepCSource.com 866-HepCSource 866-437-2768



# HEPATITIS D:

- Called HDV.
- Already infected with HBV.
- Infected blood
- Unprotected sex.
- Infected needles.



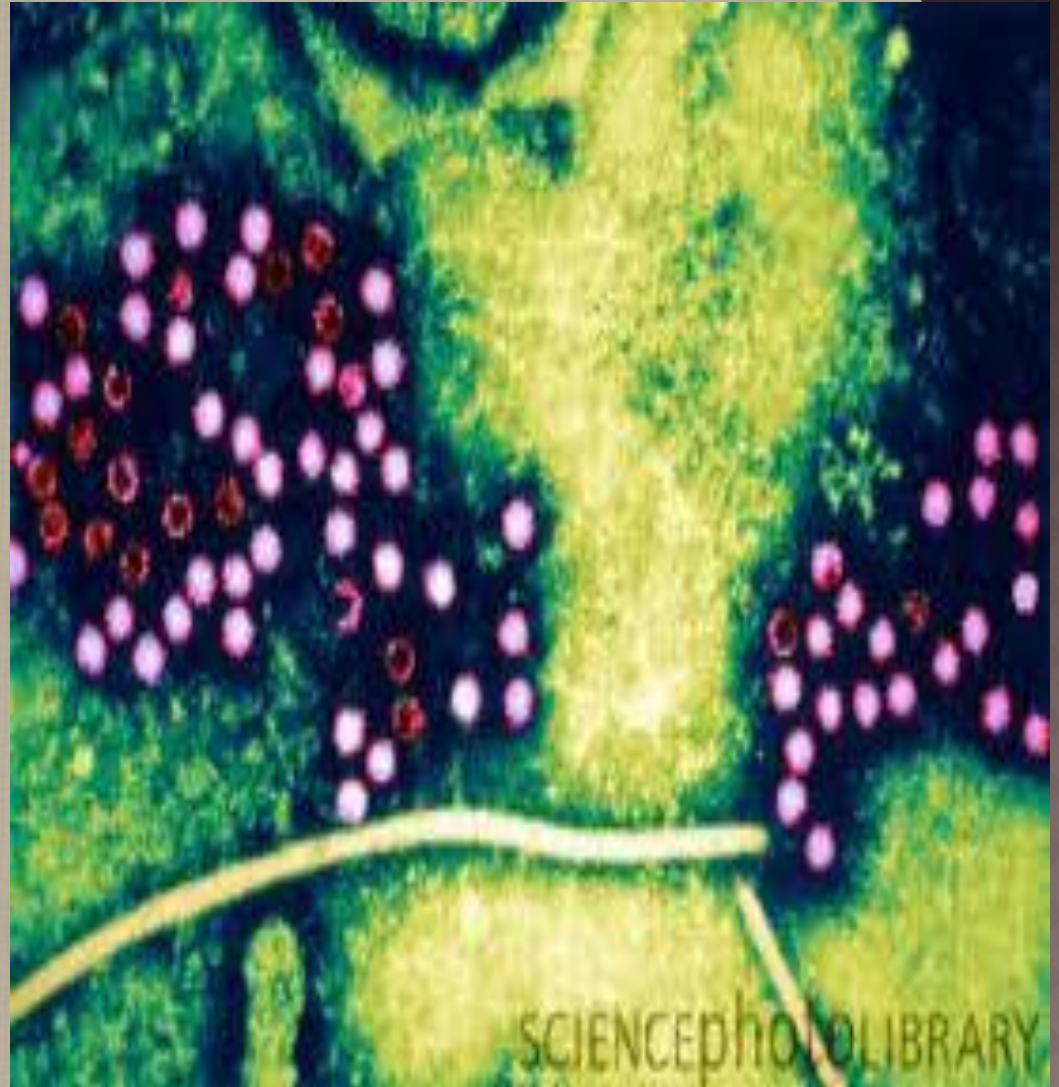
# HEPATITIS E :

- ◉ Drinking water.
- ◉ Anal or oral sex.
- ◉ Similar to HAV.



# HEPATITIS G AND X:

- Newly discovered.
- Relative of HCV.
- HXV is unknown.





Factor	Hepatitis A (HAV)	Hepatitis B (HBV)	Hepatitis C (HCV)	Hepatitis D (Delta Hepatitis)	Hepatitis E (HEV)	Hepatitis F	Hepatitis G (HGV)
<b>Occurrence</b>	Epidemic in areas of poor sanitation; common in fall and early winter	World-wide, especially in drug addicts, homosexuals, people exposed to blood and blood products; occurs all year	Post-transfusion, those working around blood and blood products, IV drug users; occurs all year	Hepatitis D virus causes hepatitis only in association with hepatitis B virus and only in presence of HBsAg	Parts of Asia, Africa, India, and Mexico where there is poor sanitation	Is rare and difficult to diagnose because of lack of testing methods	Associated with chronic viremia lasting 10 years; rarely causes frank hepatitis
<b>Incubation Period</b>	About 30 days	6 weeks to 6 months; mean 12-14 weeks	6-7 weeks	New cases now infrequent; same as for hepatitis B	14-60 days; mean 40 days	-	-
<b>Risk factors/ High-risk groups</b>	Close personal contact or by handling feces-contaminated wastes; poor sanitation; people who work with animals from HAV endemic areas or who eat raw or steamed shellfish	Health care workers in contact with body secretions, blood, and blood products; hemodialysis and post-transfusion clients; homosexually active males and drug abusers	Similar to that for hepatitis B; also, IV drug use, intranasal cocaine use, body peircing, multiple sex partners	Same as for Hepatitis B	Traveling or living in areas where incidence is high	-	Health care workers in hemodialysis, IV drug users, hemodialysis clients, chronic hepatitis B or C clients
<b>Transmission</b>	Infected feces, fecal-oral route; may be airborne if copious secretions; shellfish from contaminated water; no carrier state	Most cases in United States now result from heterosexual transmission; contact with blood and body fluids; carrier state	Contact with blood and body fluids; source of infection uncertain in many clients; carrier state	Co-infects with hepatitis B; close personal contact; carrier state	Fecal-oral route; food-or water-borne; no carrier state	-	Percutaneous
<b>Severity</b>	Mortality low; rarely causes fulminating hepatic failure	More serious, may be fatal	Can lead to chronic hepatitis	Similar to hepatitis B; more severe if occurs with chronic hepatitis B; increased risk of hepatocellular carcinoma	Illness self-limiting; mortality rate in pregnant women 10%-20%	-	Does not appear to cause liver disease
<b>Diagnostic Tests</b>	Anti-HAV-IgM-positive in acute hepatitis; IgG-positive after infection	HBsAg, HBV-DNA, anti-HBc-IgM, HbeAg, anti HBsAg	Anti-HCV or anti-HDV, HCV RNA	HDAg-positive (anti-HDV), HDV RNA serum	Anti-HEV	-	Anti-HGV
<b>Prophylaxis and active or passive immunization</b>	Hygiene; immune globulin (passive), inactivated hepatitis A vaccine	Hygiene, avoidance of risk factors; HBIG (passive), recombinant	Hygiene anti-HCV interferon alfa-2b in combination	Hygiene; hepatitis B vaccine (active)	Hygiene, sanitation; no vaccine	-	Hygiene

# SYMPTOMS:

- Mild flu
- Rash
- Diarrhea
- Mild fever
- Abdominal pain
- Vomiting
- Weightloss



# CONT...

- ◉ Circulation problem
- ◉ Dark urine
- ◉ Dizziness
- ◉ Drowsiness
- ◉ Enlarged spleen
- ◉ Headache
- ◉ Hives
- ◉ Itchy skin
- ◉ Light closed feces
- ◉ Yellow skin .





# SYMPTOMS OF HEP IN CHILDREN

- ◉ Difficulty gaining weight.
- ◉ Growing normally.
- ◉ Mental development.



# PATHOGENESIS - HAV

Cause subacute disease in children & young adults.

HAV invade into human body by fecal-oral route, multiplies in the intestinal epithelium & reaches the liver by hematogenous spread.

After one week, the HAV reach liver cells replicate within. Then enter intestine with bile and appear in feces.

Incubation Period : 2 to 6 weeks.

# PATHOGENESIS – HAV contd--

- After HAV replicating and discharging, liver cells damage begin



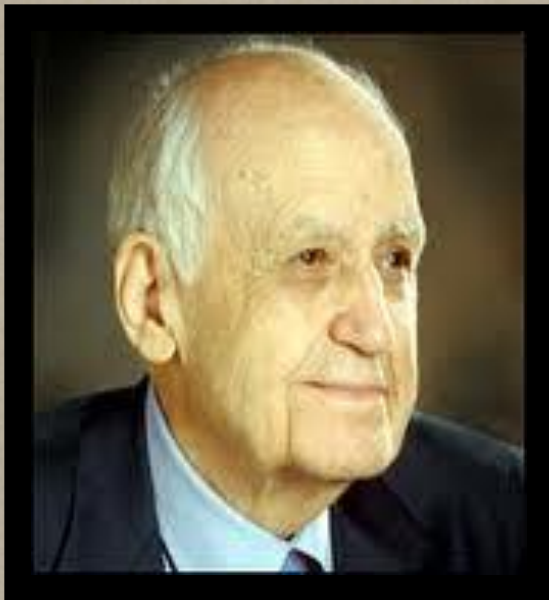
# Hepatitis A Vaccination Strategies

## Epidemiologic Considerations

- Many cases occur in community-wide outbreaks
  - no risk factor identified for most cases
  - highest attack rates in 5-14 year olds
  - children serve as reservoir of infection
- Persons at increased risk of infection
  - travelers
  - homosexual men
  - injecting drug users

# VACCINES HISTORY OF HEPATITIS A

➤ The first successful vaccine  
invented by Maurice Hilleman  
at Merck.



# VACCINES OF HEPATITIS A:

hepatitis a vaccine is available as

- HAV(alone)
- HAV with the combination of HBV

- HAVRIX(hepatitis a vaccine)
- VAQTA (hepatitis a vaccine)
- TWINRIX (with hepatitis B vaccine)





# HAVRIX (HEPATITIS A VACCINE)

Product Havrix

Manufacture by GLAXOSMITHKLINE

Year licensed 1995

Havrix is sterile suspension  
Inactivated virus for intramuscular  
administration

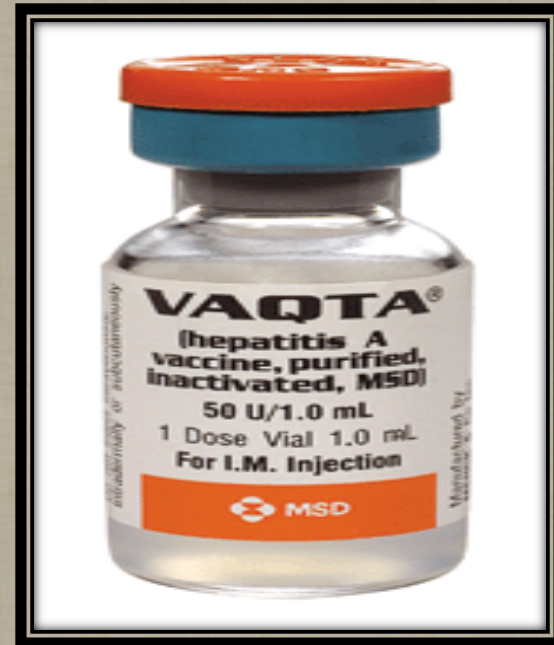
A vaccine is whole killed hepatitis a virus.  
It does not contain live virus so u cant get  
hepatitis from vaccines.



# VAQTA VACCINES OF HEPATITIS A

Manufactured by MERCK  
Generic name: hepatitis a vaccine

Vaqta is inactivated whole virus vaccine  
Derived from hepatitis A.



# HOW TO USE HEVRIX AND VAQTA VACCINES OF (HEPATITIS A)

The vaccine is usually given by injections intra muscular

By a health care professional , a series of 2 injections is usually given 6 to 8 month period.





# DOSAGE OF HAVRIX AND VAQTA (HEPATITIS A VACCINE)

## CHILDREN AND ADOLESCENTS.

Primary immunization for children (12 months to 18 years age)

Consist of a single 0.5ml and 0.5 ml booster dose administered between 6 to 12 months ...

## ADULT DOSE.

Primary immunization for adults

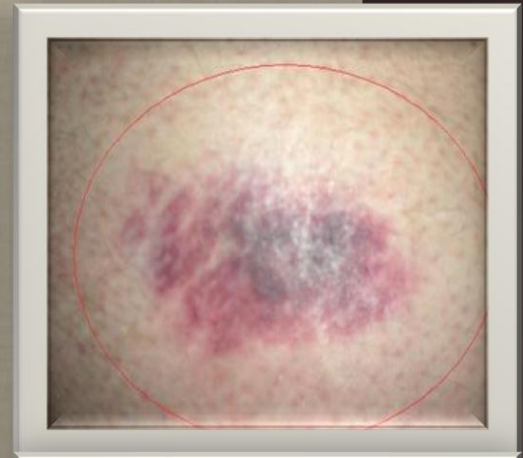
Consist of a single 1ml dose

And 1ml booster dose administered

Between 6 to 12 months



# SIDE EFFECTS OF HEVRIS AND VAQTA (HEPATITIS A VACCINE)





# TWINRIX (HEPATITIS A VACCINE)

- Manufactured by GSK
- Main use .prevention of hepatitis A and B
- IT Contains inactivated hepatitis a virus and extract of hepatitis B virus.





# TWINRIX FOR ADULT AND CHILDREN

➤ TWINRIX adult is suitable for adult aged 16 years and over

➤ Twinrix children is suitable for adolescents 1 to 5 years



SCIENCEPHOTOLIBRARY



# HBV: Modes of Transmission

- Parenteral - IV drug abusers, health workers are at increased risk.
- Sexual - sex workers and homosexuals are particular at risk.
- Perinatal (Vertical) – mother (HBeAg+) → infant.

# Concentration of Hepatitis B Virus in Various Body Fluids

<b>High</b>	<b>Moderate</b>	<b>Low/Not Detectable</b>
blood	semen	urine
serum	vaginal fluid	feces
wound exudates	saliva	sweat
		tears
		Breast milk



# Clinical Features

Incubation period: Average 60-90 days  
Range 45-180 days

Insidious onset of symptoms.

Tends to cause a more severe disease than Hepatitis A.

Clinical illness (jaundice): <5 yrs, <10%  
≥ 5 yrs, 30%-50%  
1/3 adults-no symptoms  
Clinical Illness at presentation 10 - 15%

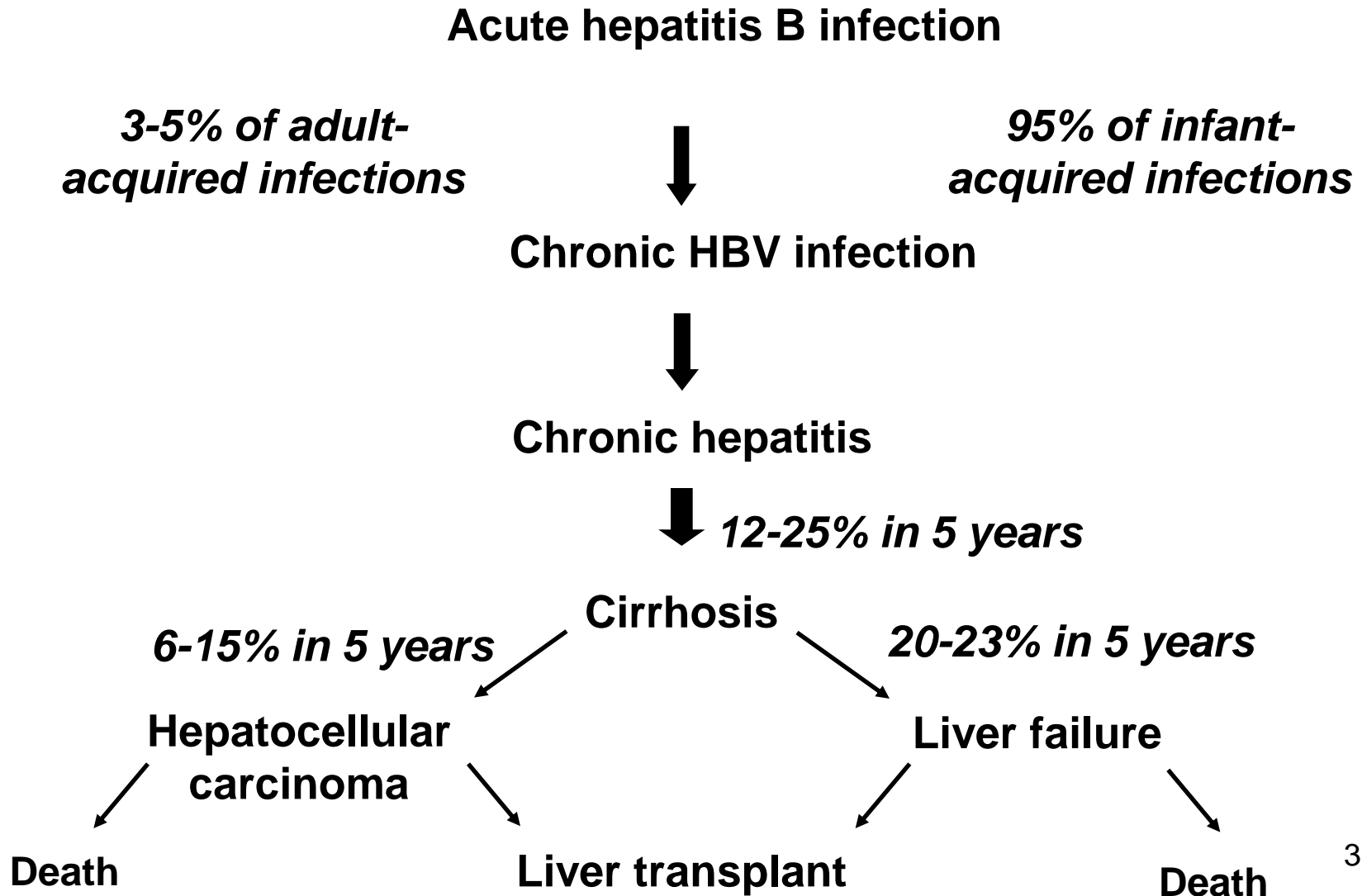
Acute case-fatality rate: 0.5%-1%

Chronic infection: < 5 yrs, 30%-90%  
≥ 5 yrs, 2%-10%

More likely in asymptomatic infections

Premature mortality from chronic liver disease: 15%-25%

# Possible Outcomes of HBV Infection



# 、 Current Treatment Options

- Interferon alfa (Intron A)
- Response rate is 30 to 40%.
- Lamivudine (Epivir HBV)  
(relapse ,drug resistance)
- Adefovir dipivoxil (Hepsera)



# Treatment

- Interferon - for HBeAg +ve carriers with chronic active hepatitis. Response rate is 30 to 40%.
  - alpha-interferon 2b (original) (INTL units)
  - alpha-interferon 2a (newer, claims to be more efficacious and efficient)
- Lamivudine - a nucleoside analogue reverse transcriptase inhibitor. Well tolerated, most patients will respond favorably. However, tendency to relapse on cessation of treatment. Another problem is the rapid emergence of drug resistance.
- Adefovir (10mg po) – less likely to develop resistance than Lamivudine and may be used to treat Lamivudine resistance HBV. However more expensive and toxic (less than 12 yrs)
- Entecavir – most powerful antiviral known, similar to Adefovir
- Successful response to treatment will result in the disappearance of HBsAg, HBV-DNA, and seroconversion to HBeAg.

- Alpha interferons, cause or aggravate fatal or life-threatening neuropsychiatric, autoimmune, ischemic, and infectious disorders
- Depression and suicidal behavior including suicidal ideation, suicide attempts was reported in patients receiving interferon alfa-2a.
- Interferon alfa-2a used with extreme caution in patients who reported a history of depression.
- Interferon alfa-2a should be used with caution in patients with preexisting cardiac disease
- Severe or fatal gastrointestinal hemorrhage has been reported in association with alpha interferon therapy.
- Ulcerative and hemorrhagic/ischemic colitis, sometimes resulting in death, have been observed within 12 weeks of starting alpha interferon therapy.
- Alpha interferons suppress bone marrow function and may result in severe cytopenias and anemias including rarely aplastic anemia. Cytopenias can lead to an increased risk of infections or hemorrhage.

## Entecavir side effects

Allergic reaction: hives; difficulty breathing; swelling of your face, lips, tongue, or throat.

lactic acidosis (a build-up of lactic acid in the body, which can be fatal). Lactic acidosis can start slowly and get worse over time. Mild symptoms of lactic acidosis, such as:

- muscle pain or weakness;
- numb or cold feeling in your arms and legs;
- trouble breathing;
- feeling dizzy, light-headed, tired, or very weak;
- stomach pain, nausea with vomiting; or
- slow or uneven heart rate.



Entecavir may also cause severe liver symptoms.

low fever;

nausea, stomach pain, loss of appetite;

dark urine, clay-colored stools; or

jaundice (yellowing of the skin or eyes).

Less serious side effects may include:

mild nausea, vomiting, diarrhea, upset stomach;

temporary hair loss;

headache;

skin rash; or

sleep problems (insomnia).

# 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.

# VACCINATION:

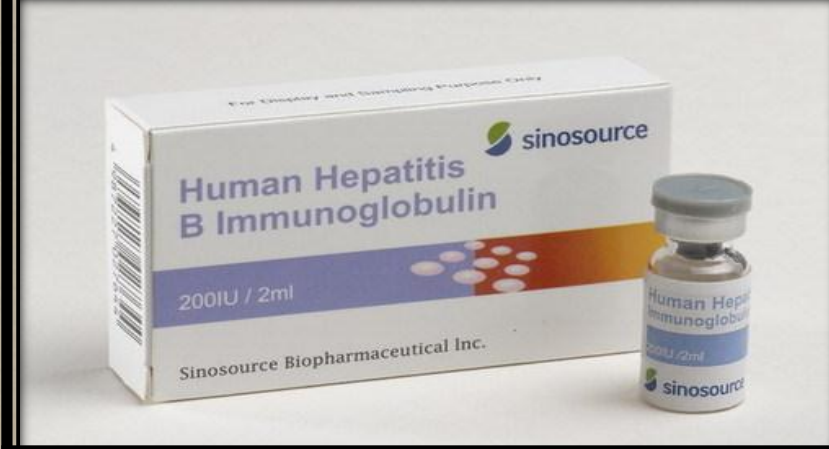
The first vaccine became available in 1981.

The vaccine contains :

## HBsAg

It is produced by yeast cells, into which the genetic code for HBsAg has been inserted.

A course of three (3) vaccine injections is given. Afterward an immune system antibody to HBsAg is established in the bloodstream. The antibody is known as *anti-HBsAg*. This antibody and immune system memory then provide immunity to hepatitis B infection.





# MEDICATIONS:

Acute hepatitis B does not require medication.

Chronic hepatitis B requires proper medication, currently, there are at least six drugs available:

## 1. Interferon:

- Usually a good choice for young people without serious liver disease.
- Treatment duration is relatively short (24 to 48 weeks) compared to other hepatitis B therapies.

### Side effects:

- Not available for people with failing livers.
- Most expensive compared to the other drugs.
- Pegylated interferon not approved for children.



## 2. Lamivudine:

- Least expensive.
- One of the older hepatitis B drugs, so a lot is known about its safety.
- Might be helpful in treating HIV co-infection in combination with tenofovir.
- Approved for both children and adults.



### Side effects:

- Often loses its effectiveness against the hepatitis B virus.
- Requires long-term treatment.

### 3. Adefovir dipivoxil

- Can be used in patients with lamivudine-resistant hepatitis B virus.



#### Side effects:

- Can be toxic to your kidneys at high doses.
- Requires long-term treatment.

#### 4. Entecavir:

- Has an extremely low rate of resistance.
- Might be helpful in patients with failing livers.



#### Side effects:

- A newer drug.
- Requires long-term treatment.



## 5. Telbivudine:

- More powerful antiviral drug than lamivudine and adefovir.



### Side effects:

- As likely as lamivudine to become resistant to hepatitis B virus.
- Requires long-term treatment.
- Not approved for children.

## 6. Tenofovir:

- Excellent at treating regular and drug-resistant types of hepatitis B virus.
- Treats both HIV and the hepatitis B virus.



### Side effects:

- It's a relatively new drug for treating hepatitis B.
- Not approved for children.
- Requires long-term treatment.
- Regular monitoring of kidney function is necessary.

# Hepatitis B Vaccine

- Infants: several options that depend on status of the mother
  - If mother HBsAg negative: birth, 1-2m, 6-18m
  - If mother HBsAg positive: vaccine and Hep B immune globulin within 12 hours of birth, 1-2m, <6m
- Adults
  - \* 0, 1, 6 months
- Vaccine recommended in
  - All those aged 0-18
  - Those at high risk

# HEPATITIS C



# Hepatitis C Virus

HCV is found in the blood and body fluids (e.g., semen, vaginal fluids) of an infected person

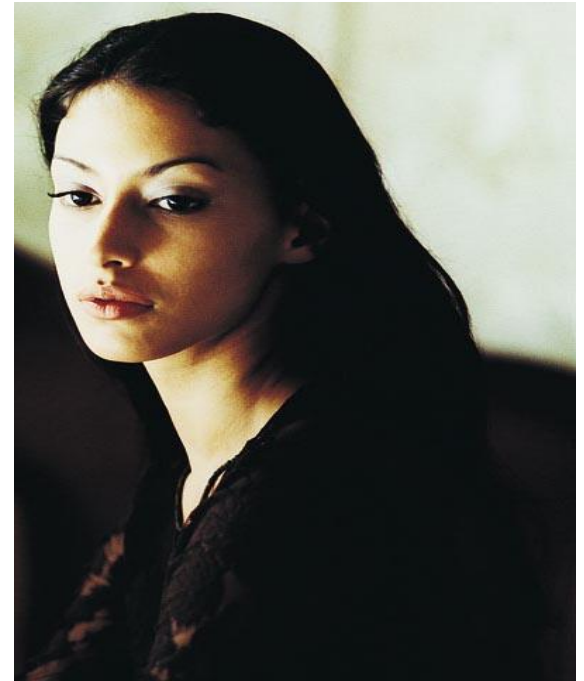
**Average incubation period** : is 7 to 9 weeks



# Symptoms

You might have :

- Tiredness
- Loss of appetite
- Fever
- Stomach-ache
- Diarrhea
- Dark urine
- Jaundice (yellow skin and eyes)



# PREVENTION

- No vaccine for the prevention of HCV transmission
- Best means of preventing transmission of HCV is to prevent contact with infected blood and organs and to avoid high-risk sexual behavior such as multiple partners and anal contact.
- Avoiding alcohol and drugs that can damage the liver may help slow the rate of progression of the disease.

# MEDICAL TREATMENT

- **pegylated interferon alpha (Pegasys, PEG-Intron)** - often combined with an antiviral drug called ribavirin (Virazole)



- PegIntron (peginterferon alfa-2b) is made from human proteins that help the body fight viral infections.
- PegIntron is used to treat chronic hepatitis C in adults. Peginterferon alfa-2b is often used in combination with another medication called ribavirin (Rebetol, Ribasphere) to treat hepatitis C in adults and children who are at least 3 years old.
- PegIntron may be used in combination with boceprevir (Victrelis) or telaprevir (Incivek) to treat hepatitis C in adults.
- PegIntron may also be used for purposes not listed in this medication guide

## Serious Side Effects

- vision problems;
- fast heart rate, feeling like you might pass out;
- fever, chills, body aches, flu symptoms, pale skin, easy bruising or bleeding, unusual weakness;
- high fever with severe stomach pain and bloody diarrhea;
- pain or burning when you urinate;
- severe pain in your upper stomach spreading to your back, nausea and vomiting, fast heart rate;
- cough with mucus, feeling short of breath, chest pain, uneven heartbeats;
- sudden numbness or weakness, problems with vision, speech, or balance; or
- new or worsening liver symptoms (upper stomach pain, dark urine, jaundice).

## LESS SERIOUS:

PegIntron side effects may include:

- dizziness, tired feeling;
- headache, joint or muscle pain;
- nausea, dry mouth, loss of appetite, weight loss;
- sleep problems (insomnia), feeling mildly anxious, depressed, or irritable; or
- pain, redness, swelling, or irritation where the medicine was injected

# *Certain medical conditions preclude the use of interferon*

- Depression and certain other mental and neurologic disorders
- Active alcohol or drug abuse
- Autoimmune diseases such as rheumatoid arthritis, systemic lupus erythematosus, or psoriasis
- Low blood hemoglobin level (anemia) or blood cell counts
- Cirrhosis that is severe enough to cause symptoms such as jaundice, wasting, fluid retention that causes swelling, or mental disturbances



# Medication

- Interferon alpha (Intron A) - pegylated type (Pegasys, PEG-Intron)
  - Interferon is a protein that the body makes naturally in response to viral infections in order to fight the infection. Pegylation describes a chemical process that makes the interferon last longer in the body.
- Ribavirin (Virazole)
  - has little effect on HCV, but interferon increases its potency

# *Surgery and Other Therapy*

- For end-stage liver disease, the only treatment is liver transplantation
- Alternative therapies has not been proven to work in any scientific study
  - most promising complementary therapy is milk thistle
  - licorice and ginseng
  - ginger (to reduce nausea) and St. John's wort (to relieve depression) may be taken as complementary therapy to help relieve the side effects of interferon

# *Patient Counseling*

- Eat a varied, healthy diet, take part in some physical activity daily, and get plenty of rest.
- Drink plenty of water and other noncaffeinated fluids to stay well hydrated.
- Avoid alcoholic beverages and medicines such as nonsteroidal anti-inflammatory drugs (like Brufen, [Aleve](#), Advil) that can be harmful in people with liver disease.
- If you have symptoms, avoid prolonged or vigorous physical exercise until your symptoms improve.
- If symptoms worsen at any time, contact your doctor.