Hepatitis

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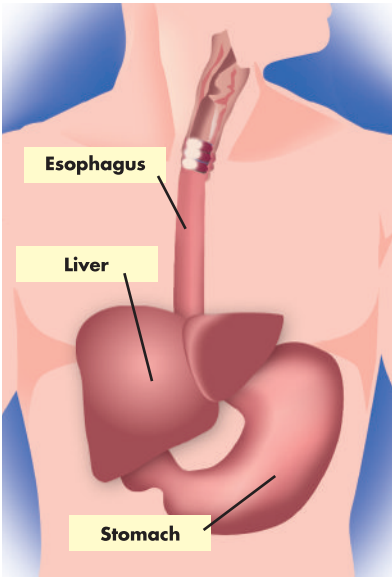
Table of Contents

Your liver - a worker with many tasks!

The liver is not only the largest internal organ, but also one of the most fascinating and complex organs. It weighs about three pounds and is located in the upper right abdomen, under the diaphragm, protected by the rib cage. The gallbladder sits right behind the liver and is partially embedded in it.



The liver performs more diverse and complex tasks than any other single organ. It is like a *chemical factory*, making many substances necessary for life. It also acts as a *storage facility* to store many of those substances until they are needed by the body. It acts as a *regulatory agent*, constantly keeping track of substances in the body and making adjustments when needed. The liver also acts as an *efficiency expert* to recycle substances necessary for life, and it functions as a *toxic waste control expert* that continuously removes toxic chemicals from the body before they can cause damage. In addition to all of those jobs, the liver even renews its own cells constantly, replacing over 200 billion cells every six months or so. The next few paragraphs explore liver functions in more detail.

Nutrient processing and storage

Glucose and glycogen for energy

The liver makes sure that the body has a ready supply of fuel for energy by processing and storing carbohydrates that we eat as *glucose* (for ready fuel) and *glycogen* (the form of glucose that can be stored for later use). The liver keeps track of glucose levels in

the bloodstream at all times, and when levels are low, the liver changes glycogen back into glucose so it can be used for fuel immediately.

Proteins and fats can also be used by the liver to make glucose if carbohydrates are not available or if glucose and glycogen supplies have been used up. The liver monitors the levels of vitamins and minerals in the bloodstream as well. It also stores *fat-soluble vitamins, A,D,E* and *K,* and *water-soluble vitamins, B-complex* and C. Among the minerals stored by the liver are *iron, zinc, magnesium* and *manganese*.

Bile production and recycling

The continuous manufacture of *bile* is among the most important functions of the liver. Bile is a greenish-yellow liquid composed of *bile salts, water, fatty acids, bilirubin* and *cholesterol*. It is necessary for digesting and absorbing life-sustaining fats and fat-soluble vitamins. The gallbladder stores bile in a concentrated form until it is released into the small intestine to help digestion. Some bile is eventually released through feces, but the majority is recycled or reabsorbed in the small intestine, routed back to the liver, which efficiently recycles it for future use.

Regulatory functions

The liver maintains the glucose level in the bloodstream needed to support life. That function depends on certain hormones such as *insulin, adrenaline,* and *growth hormone* that circulate in the bloodstream. Those hormones help the liver "understand" when to release more or less glucose. Some extremely powerful hormones such as *thyroid, adrenal* and *sex hormones* are regulated and released by the liver. Those hormones could create major problems if allowed to circulate in the system for too long, so the liver atually inactivates them when necessary to maintain a level that is best for the body.

The liver also both *produces* and *regulates* the amounts of several different proteins (*albumin*, *globulin* and *fibrinogen*) in the blood-stream, without which blood would fail to clot properly, and our ability to fight infection would be seriously impaired.

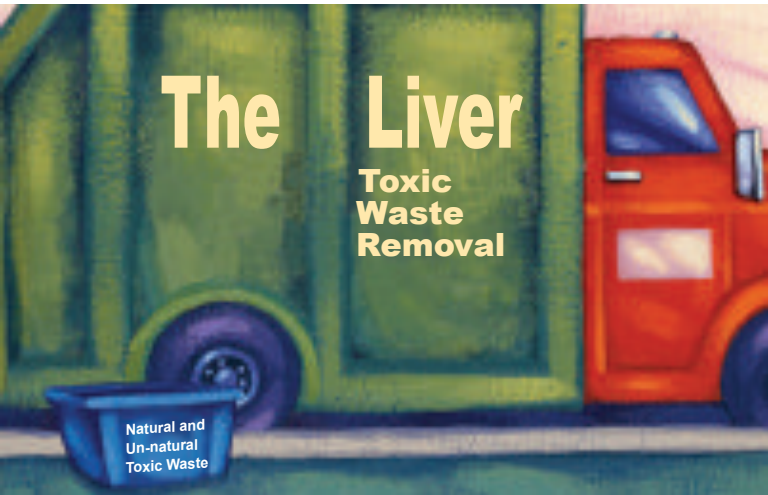
Toxic waste removal

As a toxic waste expert, the liver purifies blood constantly, removing both *natural* and *unnatural* harmful substances. Strong enzymes in the liver break down wastes or toxic agents into water-soluble substances that can be passed from the body as urine and/or feces.

Natural toxic waste

The body produces some waste products that occur from the normal aging or wearing down of body tissue. But, if those wastes were allowed to stay in the body, serious damage would occur. *Nucleic acid* from worn out cells is converted to *uric acid*. *Nitrogen* from protein breakdown is converted to *urea*. Both can be released harmlessly into the bloodstream and finally, out of the body through the kidneys in urine. *Ammonia* is another poisonous by-product of natural processes that must be regularly removed. It is converted to urea by the liver and eliminated in urine.

Red blood cells are constantly replaced within the body and a by-product of that process, hemoglobin, is a waste product that must be eliminated. Hemoglobin is converted by the liver into a substance known as bilirubin, which is used by the liver to make bile. If something happens to destroy the function of the liver, bilirubin can build up because it is not being released through



the small intestine as bile. That build-up of bilirubin (*hyperbilirubinemia*), is responsible for the yellowish skin color that is commonly called *jaundice*. Jaundice may be a symptom of heptitis and other diseases that affect the liver.

Unnatural toxic waste

In addition to removing naturally-occuring wastes, the liver is a watchdog for other harmful substances that somehow enter the body. It is the liver's job to eliminate them before they injure sensitive body tissue. Eighty percent of *prescription drugs, non-prescription* and *illegal drugs* are eliminated from the body by the liver. And many of those chemicals must be changed a lot before they can even pass from the body – work that also must be done by the liver. Such is the case for *alcohol*. The liver must de-toxify alcohol before it can be released. The liver can only de-toxify a certain amount of alcohol per hour, so if a person drinks more than the liver can process, alcohol builds up in the bloodstream, causing a high blood alcohol level and the condition we commonly call "being drunk."

Even some seemingly harmless, commonly-used medicines, Lsuch as *Tylenol*, can be toxic, causing great stress or damage to the liver if used in excess or at dosages higher than recommended. Also, when some drugs like Tylenol are combined with alcohol, the damage to the liver is magnified.

Insecticides, herbicides, industrial wastes and even *paints* and *solvents* are absorbed through the skin or inhaled and eventually reach the liver through the bloodstream, where they are singled out by the liver to be dealt with. The liver usually must modify them to eliminate them from the body. The liver must also deal with chemicals added to the food we eat.

Bacteria, viruses and *other microorganisms* are also filtered out of the bloodstream and made harmless by the liver. Specialized cells in the liver may actually surround and chemically digest such enemies. The liver also manufactures antibodies to help in the process of destroying foreign invaders.

In Summary . . .

After reading about the liver, it should be easy to understand the havoc that could occur in the body if the liver is damaged. Even though we know a lot about the liver, researchers are still discovering the ways that the liver sustains life.

What you need to know about hepatitis

What is hepatitis?

Hepatitis is an inflammation of the liver that can cause harm or death of liver cells. About 70,000 cases are documented each year in the United States, but that is thought to be a small fraction of the cases that actually occur. There is no quick cure for hepatitis. You can have it more than once, because there is more than one virus that causes it.

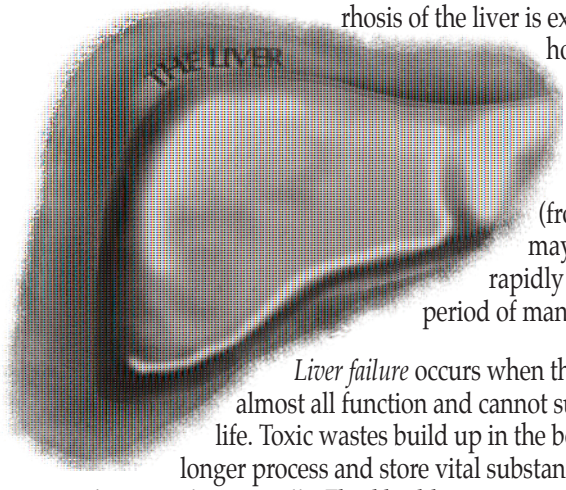
Most patients with hepatitis recover completely within weeks or months, but an estimated one patient in a thousand dies from hepatitis A, and about 1 of every 100 patients dies from hepatitis B. The fatality rate for hepatitis C is lower than for type B, but higher than for type A.

Hepatitis is usually caused by viruses but can be caused by toxic substances.

When the liver is harmed

The liver has some ability to repair itself when harmed, but if damage continues, a gradual progression of liver disease occurs. When the liver first becomes infected and inflames (as with hepatitis), small scars are caused by its effforts to repair itself. Those scars are called fibrosis. Scarred tissue simply does not work as well as normal healthy liver tissue. The amount of liver function affected depends on the degree of scarring.

Cirrhosis of the liver occurs when large areas of the liver have become scarred. Blood cannot flow through it normally, and *many* functions of the liver are seriously impaired. The liver becomes smaller and hardened. The most common cause of cirrhosis of the liver is excessive alcohol use, but it can be caused by hepatitis. Cirrhosis (from hepatitis) may develop rapidly or over a period of many years.

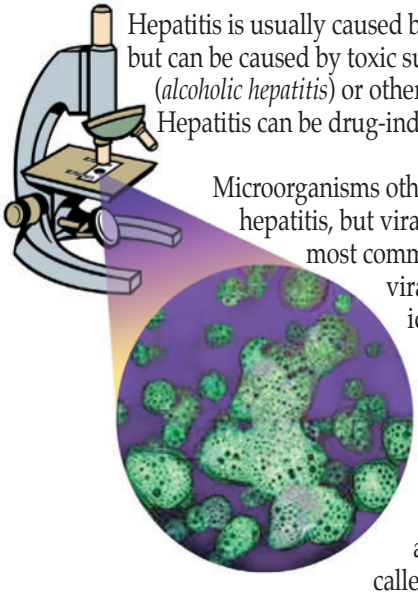


Liver failure occurs when the liver has lost almost all function and cannot sustain life. Toxic wastes build up in the body, it can no longer process and store vital substances, and blood does not clot normally. Fluid build-up is common, the skin becomes dark yellow, internal bleeding may occur and even mental function is impaired. A liver transplant then becomes necessary.

The most common cause of cirrhosis of the liver is excessive alcohol use.

Liver cancer is more common among patients who have chronic hepatitis B or C, because damage to the cells in the liver may cause changes in the genetic structure, creating a situation in which liver cells are more likely to become cancerous.

What causes hepititis?



Hepatitis is usually caused by viruses (*viral hepatitis*), but can be caused by toxic substances such as alcohol (*alcoholic hepatitis*) or other chemicals (*toxic hepatitis*). Hepatitis can be drug-induced.

Microorganisms other than viruses can cause hepatitis, but viral hepatitis is by far the most common. Several types of viral hepatitis have been identified and researchers are still discovering new viruses responsible for the disease. The most common types of hepatitis are *hepatitis A*, *hepatitis B*, and *hepatitis C* (formerly called non-A non-B type). Three other types have been identified but are not as common — types *D*,*E*, and *G*. Another category, X, is currently a catch-all for hepatitis-causing viruses that do not fit into the other categories.

Acute and chronic hepatitis

Acute hepatitis usually lasts for less than six months, then the body rids itself of the virus. However, *chronic hepatitis* lasts longer than six months and the body may never be able to completely rid itself of the virus. Those with chronic hepatitis may experience periods of time when they are symptom free and periods of time with flare-ups of symptoms.

Fulminant hepatitis

Patients who have one type of hepatitis can also have other types. This is particularly serious for those who have hepatitis B or C. Fulminant hepatitis is a life-threatening complication that can occur. *Fulminant hepatitis* is a deadly, rapid form of hepatitis that is caused when a person with hepatitis B or C also gets

hepatitis A. For that reason, doctors usually recommend that patients who have hepatitis B or C be vaccinated against hepatitis A.

Hepatitis A (HAV)

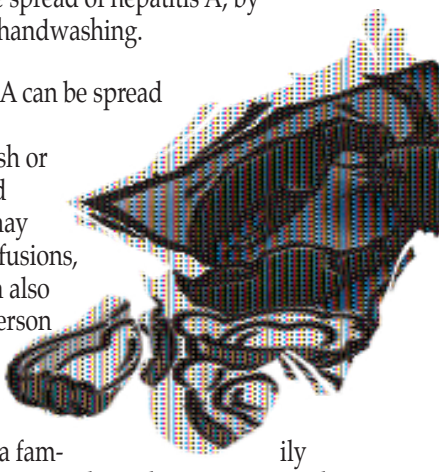
Hepatitis A is usually the milder form of viral hepatitis, although complications may occur. Symptoms may be so mild that many people are not even aware that they have it. Hepatitis A infections are usually acute, meaning that the virus is usually completely gone within six months. Hepatitis A, also called *infectious hepatitis*, is contagious, meaning it can be passed on to others.

Hepatitis A is passed from person to person by fecal contamintion.

How is a person infected with hepatitis A?

It is passed from person to person by *fecal contamination* also known as the *fecal-oral route of infection*. For instance, if an infected person did not properly handwash after having a bowel movement, and stool was still present on his or her hands, that person could contaminate another person's food, spoon or fork. When another person eats contaminated food or eats with contaminated utensils, the virus is passed. Simlarly, if infected stool

was on a bathroom doorknob, and an uninfected person touched it and did not wash before handling and eating food, infection could be passed on. In the same manner, just *one* infected food handler could literally infect hundreds or thousand of persons. The best way to prevent the spread of hepatitis A, by fecal-oral route, is through handwashing.



Another way that hepatitis A can be spread is through contaminated water suppy or by eating fish or shellfish from contaminated water. Hepatitis infection may also come from blood transfusions, though it is not likely. It can also be spread from person to person by kissing or sexual contact. It is common for many members of a family to acquire the disease from general household contact, such as sharing drinking glasses or other common items.

Risk factors for hepatitis A

There is greater risk of becoming infected when the chance of fecal contamination is high.

- Those who work in child care facilities or nursing homes are at greater risk as are children who atttend day care and residents of long term care facilities.
- Food handlers are at greater risk.
- International travelers are at greater risk becase of the greater possibility of unsanitary water and food preparation outside the U.S.
- Those who share contaminated needles are at greater risk.
- Those who are in close contact wth a person who has been diagnosed with hepatitis A are at higher risk, because they are more likely to share drinking glasses or other common items.
- Kissing or sexual contact with an infected person places one at greater risk.

Symptoms of hepatitis A

Some people with hepatitis A never know it, because the symptoms are often mild. Children under age two are often not diagnosed. However, most people experience flu-like symptoms including muscular aches and pains and feeling extremely tired (fatigue). Some experience diarrhea, nausea, and vomiting as well as pain or heaviness in the upper right abdomen where the

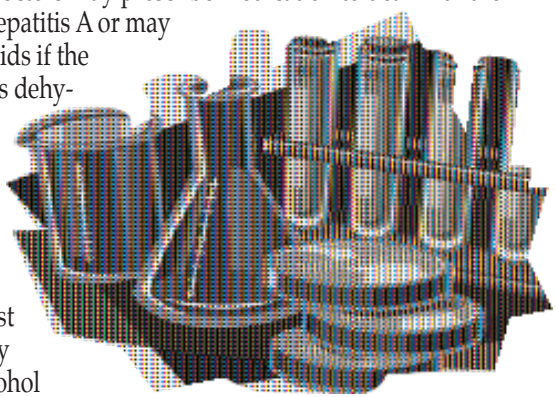
Some people with hepatitis A never know they have it.

liver is located. Fever, light colored stools, and darker than normal urine are also possible. Some hepatitis patients become jaundiced (the skin and white part of the eyes become yellowed). Most people with hepatitis, however, do not become jaundiced. Hepatitis patients also may experience itchy skin, and weight loss is not unusual.

Diagnosis and treatment of hepatitis A

Hepatitis A is diagnosed by a patient's history of exposure and symptoms. Blood tests for levels of *liver enymes* and *antibodies* to the hepatitis A virus are often used to diagnose hepatitis A.

There is no cure for hepatitis A. The body usually rids itself of the virus in time. Doctors may prescribe medication to deal with the symptoms of hepatitis A or may prescribe IV fluids if the patient becomes dehydrated from nausea and vomiting. Usually, the patient is told to eat well and get plenty of rest to help the body recover. No alcohol should be consumed, because it is toxic to the liver.



Hepatitis B (HBV)

When compared to hepatitis A, patients with hepatitis B (known as *serum hepatitis*) typically are much sicker, and their recovery rate is much slower. About 10% of these infections become chronic with long-term, slow damage to the liver. In addition to the acute phase of the disease (when symptoms are at their peak), hepatitis B patients may become symptomless carriers of the infection. That means that they may pass it on to others even if they do not have symptoms. It is a very serious form of hepatitis and is thought to have over three million carriers worldwide and an estimated one million carriers in the United States.

How is a person infected?

Hepatitis B is spread from person to person by blood, including blood from cuts, nosebleeds, mentrual blood and transfusions. A tiny amount of infected blood is all that is needed to spread the virus. That is why infection can be caused by sharing common items like toothbrushes, razors, and fingernail files or clippers.

Hepatitis B is spread from person to person by blood.

Tattoos and body piercing by unclean instruments can also spread infection . Hepatitis B is also spread by sexual contact with an infected person and may be passed from mother to child at birth.

Blood banks in the United States take precautions to make sure that our blood supply is safe and health care professionals are careful to properly dispose of materials that have been in contact with body fluids from an infected person.

Risk factors for hepatitis B

The following risk factors place a person at greater than average risk of hepatitis B.

- Working in positions that cause exposure to blood, such as health care
- Receiving hemodialysis (patients with kidney disease)
- Having unprotected sexual contact with an infected person or multiple partners
- Getting tattoos and body piercing
- Sharing equipment for inhaling cocaine or sharing needles
- Sharing grooming or hygiene items such as razors, toothbrushes and nail files or clippers
- Traveling internationally to places where hepatitis B is common

Symptoms of hepatitis B

Some people with hepatitis B have no symptoms, but most have symptoms much like the symptoms of hepatitis A: flu-like symptoms including muscular aches and pains and feeling extremely tired (fatigue). Some experience diarrhea, nausea, and vomiting as well as pain or a feeling of heaviness in the upper right abdomen, where the liver is located. Fever, light colored stools,

Some people with hepatitis B have no symptoms.

and darker than normal urine are also possible. Some hepatitis patients become jaundiced (the skin and white part of eyes become yellowed). Many people with hepatitis, however, do not become jaundiced. Hepatitis patients may also experience itchy skin, and weight loss is not unusual.

Diagnosis and treatment of hepatitis B

Diagnosis is based on the patient's history of exposure as well as blood tests. *Liver enzyme* tests as well as the *hepatitis B antigen* test are used for diagnosis. Additional blood tests can tell if the infection is acute or chronic and whether or not the person is a symptomless carrier of hepatitis B.

Unlike hepatitis A, early treatment of chronic hepatitis B is very important.

Unlike hepatitis A, early treatment of chronic hepatitis B is very important. Medical treatment can help avoid permanent liver damage. In addition to simple measures to help a patient deal with symptoms, and a lifestyle that includes good nutrition, plenty of rest, and no alcohol is recommended. In chronic cases, medictions such as *Interferon*, are sometimes prescribed to keep the virus from damaging the liver. The earlier that interferon treatment is started, the better the chances of preventing permanent liver damage. In about 50% of patients treated with interferon, a complete cure has been reported. Among those that are not completely cured, symptoms are reduced and liver damage is not as great.

Treatment of hepatitis B includes avoiding complications. The major complication is permanent liver damage (cirrhosis and liver failure). A life-threatening complication called *fulminant hepatitis* can also occur. Fulminant hepatitis is a deadly, rapid form of hepatitis that occurs when a person with hepatitis B or C also gets hepatitis A. For that reason, doctors usually recommend that patients who have hepatitis B or C be vaccinated against hepatitis A.

Hepatitis C (HCV)

Hepatitis C is the most serious type of hepatitis and the leading cause of liver transplants. It affects 4.5 million Americans, and thirty thousand new cases per year are expected. Hepatitis C, like hepatitis B, is spread by contaminated blood. It is the most likely type of hepatitis to occur as a result of a blood transfusion, and it is thought that one percent of all Americans are carriers of the disease.

Hepatitis C is the leading cause of iiver transplants.

Concern has grown among public health experts in the U.S., and efforts have begun to track down people who may have been infected by transfusions received long before blood donors were screened for hepatitis C. Screening tests for hepatitis C were invented in 1990 but were not very good until 1992. Now all potential blood donors are screened for hepatitis C. But an estimated 300,000 people may have been infected by blood that was never screened for hepatitis C.

People that have been infected by blood transfusion may still not be aware of it, because symptoms may not occur until long after a person has been infected. Most of the time, hepatitis C is considered a "silent infection," meaning that it is there but not causing symptoms. When infected, some people develop minor symptoms, but most of the time, no symptoms are present until chronic liver problems develop.

In many cases, a person's immune system will fight off the hepatitis C virus and eliminate it from the body, but hepatitis C becomes a chronic liver infection in about 85% of those infected. And, as many as 20% develop liver cirrhosis, which can be fatal. We know that consumption of alcohol by those who are infected may hasten the development of cirrhosis. Since symptoms may not occur for 20 years or more, people can unknowingly, permanently damage their liver.

How is a person infected?

As mentioned above, hepatitis C is the most likely type of hepatitis to be spread by transfusion. In addition, like hepatitis B, a person can become infected through a very tiny amount of infected blood, including blood from cuts, nosebleeds and menstrual blood. Infection can be caused by sharing common items like toothbrushes, razors and fingernail files or clippers. Tattoos and body piercing by unclean instruments can also spread infection. Hepatitis C is also spread by sexual contact with an infected person. And, although unlikely, it may be passed from mother to child at birth.

Risk factors for hepatitis C

The following risk factors place a person at a greater than average risk of becoming infected with hepatitis C, but there is a segment of people who develop hepatitis C (as many as one third of those infected) that have no known risk factors and still do not know how they became infected:

- Having a history of blood transfusion before 1992
- Having a history of (or currently) injecting illegal drugs or sharing instruments for intranasal cocaine use
- Long-term hemodialysis patients
- Working in occupations in which there is exposure to blood
- Sharing grooming or hygiene items such as razors, toothbrushes and nail files or clippers
- Having a tattoo or body piercing
- Having unprotected sex with multiple partners or an infected partner
- Sharing equipment for inhaling cocaine

Symptoms for hepatitis C

Most of the time hepatitis C causes no signs or symptoms. And, in some cases, symptoms do not occur for 20 years or more! However, as in other types of hepatitis, some people will have mild flu-like symptoms including muscular aches and pains and feeling extremely tired (fatigue). Some experience diarrhea, nausea, and vomiting as well as a pain or a feeling of heaviness in the

Most of the time hepatitis C causes no signs or symptoms!

upper right abdomen, where the liver is located. Fever, light colored stools, and darker than normal urine are also possible. Some hepatitis patients become jaundiced (the skin and white part of eyes become yellowed). Many people with hepatitis, however, do not become jaundiced. Hepatitis patients may also

experience itchy skin, and weight loss is not unusual. Hepatitis C generally causes no symptoms until chronic liver problems develop.

Diagnosis and treatment of hepatitis C

Because hepatitis C may cause no symptoms for years, often the infection is found during a routine physical or a screening for life insurance. Doctors diagnose those at high risk based on history of exposure and blood tests. *Liver enzyme* tests and *antibody* tests are used for diagnostic purposes. In addition, *HCV, RNA* or *viral load tests* look for genes that belong to the virus, indicating that hapatitis C is present and the amount of the virus in the blood.

Until recently, even if you had hepatitis C, there was not much that could be done medically to help. But now, medical treatment with medications such as *Interferon* and *Ribovarin* can help avoid permanent liver damage. The earlier that interferon treatment is started, the better the chances of preventing permanent liver damage.

Also, simple measures to help a patient deal with symptoms, and a lifestyle that includes good nutrition, plenty of rest and no alcohol are necessary. In about 50% of patients treated with medication, a complete cure has been reported. Among those that are not completely cured, symptoms are reduced and liver damage is not as great.

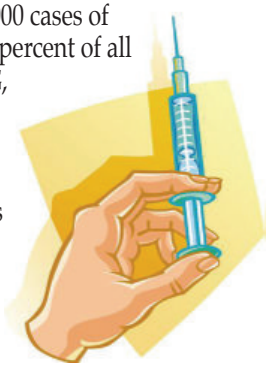
Treatment of hepatitis C includes avoiding complications. The major complication is permanent liver damage (cirrhosis and liver failure). The life-threatening complication, *fulminant hepatitis,* can also occur. It is a deadly, rapid form of hepatitis that occurs when a person with hepatitis B or C also gets hepatitis A. For that reason, doctors usually recommend that patients who have hepatitis B or C be vaccinated against hepatitis A.

Other, less common types of hepatitis

Hepatitis D, formerly called *delta hepatitis*, is spread mainly through used needles and blood and only affects people that are already infected with hepatitis B. It primarily occurs among drug users who are carriers of the type B virus. It may be transmitted to others by those people who are carriers of the B type.

Hepatitis E, uncommon to the United States, is somewhat like hepatitis A but is commonly found in the region of the Indian Ocean.

Hepatitis G is said to account for 900-2000 cases of hepatitis a year (about three tenths of a percent of all cases). Little is known about hepatitis G, except that in 90% to 100% of cases the infection becomes chronic, and that it is spread by infected blood. A person is at higher than average risk if he or she has had a transfusion or is an IV drug user. It is also known that hepatitis G occurs more frequently among those that have hepatitis C.



Hepatitis X is a category of hepatitis that represents all of the new types that are not yet well understood and are caused by viruses that were unknown until recently. These cases of hepatitis are still primarily outside the U.S. There is legitimate concern that many more hepatitis-causing viruses will be found.

The viruses that causes cold sores, chicken pox, infectious monnucleosis (kissing disease) and others can affect the liver and cause hepatitis, though it is not common.

In summary . . .

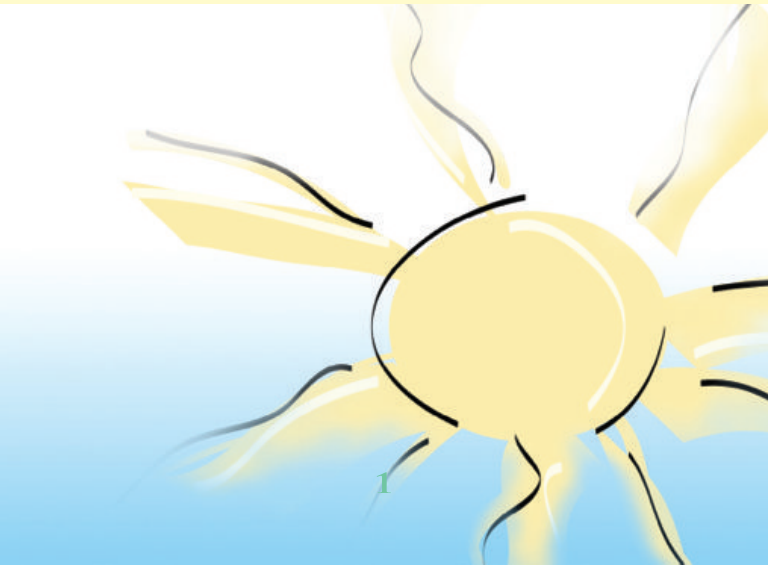
Although some types of hepatitis can be severe and life-threatening, many cases (especially hepatitis A cases) can be mild and even go completely unnoticed. Some hepatitis viruses may be completely eliminated from a patient by their own immune system and, in other cases, may be kept under control (or elminated) by the use of certain medications. Every individual responds to hepatitis viruses in their own unique way. It depends on a person's lifestyle, their age, their general level of health and many other factors.

If you have been diagnosed with hepatitis, work closely with your gastroenterologist to reduce the impact of hepatitis on your life. Also, keep in mind that hepatitis is a contagious illness that can be passed on to others. You can reduce the chance of giving hepatitis to others by understanding the risk factors and reducing the chances of risk to others.

For instance, hepatitis is spread by fecal contamination, contaminated water and contact with infected blood or body fluids. Therefore, handwashing after bowel movements, avoiding unsafe water supplies and avoiding kissing or sexual contact with an infected person are essential to prevent spread of infection. On the other hand, hepatitis B is spread primarily by contact with even a tiny amount of contaminated blood, so prevention includes never using toothbrushes or razors that belong to others. These personal items may have been contaminated with small amounts of blood.

So, to protect yourself and others from a specific type of hepatitis, follow these steps:

- Understand how that specific type of hepatitis is spread from person to person
- Make the changes necessary to reduce the risk of spreading hepatitis
- Reduce your chances of having hepatitis again
- If you have hepatitis, reduce your chances of contracting another type of hepatitis
- Minimize the impact that hepatitis might have on your life
- Reduce the chances that you will infect others



For more information about hepatitis, contact:

American Liver Foundation at 1-800-GO LIVER
(1-800-456-4837)

The Centers for Disease Control & Prevention (CDC)
1-404-332-4555

The HEP C Connection
1741 Gaylord Street
Denver CO 80206
1-800-522-HEPC
(1-800-522-4372)

The Hepatitis C Foundation
1502 Russett Drive
Warminster, PA 18974
1-215-672-1518

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