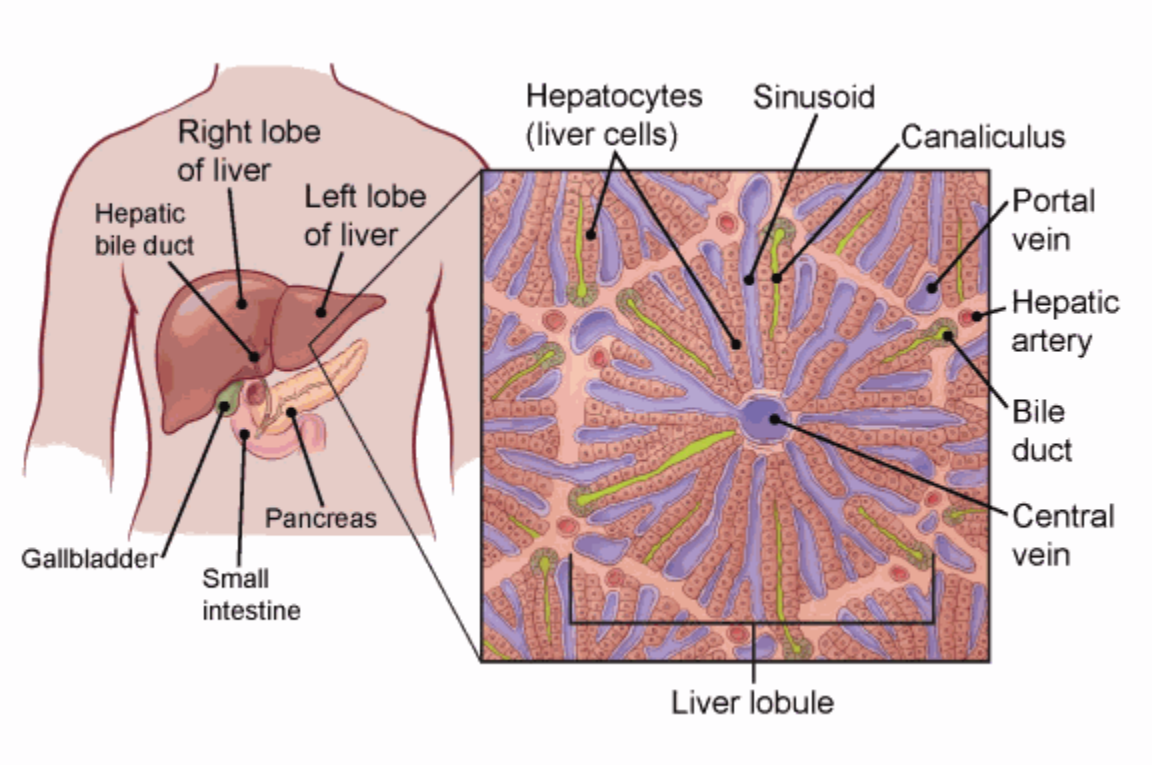
Liver Cancer

What Is Liver Cancer?
Liver cancer is cancer that starts in the liver. Cancer starts when cells in the body begin to grow out of control.

To understand liver cancer, it helps to know about the normal structure of the liver and what the liver does.

About the liver
The liver is a large internal organ that is under your right ribs just beneath your right lung. It has two lobes (sections).



The liver is made up mainly of cells called **hepatocytes**. It also has other types of cells, including cells that line its blood vessels and cells that line small tubes in the liver called **bile ducts**. The bile ducts carry a digestive fluid called bile from the liver to the gallbladder or directly to the intestines.

You cannot live without your liver. It has many important functions:

- It breaks down and stores many of the nutrients absorbed from the intestines that your body needs. Some nutrients must be changed (metabolized) in the liver before they can be used for energy or to build and repair body tissues.
- It makes most of the clotting factors that keep you from bleeding too much when you are cut or injured.
- It delivers bile into the intestines to help the body break down and absorb nutrients (especially fats).
- It breaks down alcohol, drugs, and toxic wastes in the blood, which then pass from the body through urine and stool.

The different types of cells in the liver can form several types of malignant (cancerous) and benign (non-cancerous) tumors. These tumors have different causes, are treated differently, and have different prognoses (outlooks).

Primary liver cancer
A cancer that **starts** in the liver is called **primary** liver cancer. There are different types of primary liver cancer.

Hepatocellular carcinoma (HCC)
This is the **most common** form of liver cancer in adults.

Hepatocellular cancers can grow in different ways:

- Some begin as a single tumor that grows larger. Later, it can spread to other parts of the liver.
- Some start out as many small cancer nodules throughout the liver, not just a single tumor. This is seen most often in people with cirrhosis (chronic liver damage) and is the most common pattern seen in the United States.

Most of the rest of this information is about hepatocellular carcinoma and will be referred to as liver cancer.

Intrahepatic cholangiocarcinoma (bile duct cancer)
About 10% to 20% of liver cancers start in the cells that line the small bile ducts (tubes that carry bile to the gallbladder). These are called **intrahepatic cholangiocarcinomas (bile duct cancers)**. Most cholangiocarcinomas, however, start in the bile ducts outside the liver.

Although the rest of this information is mainly about hepatocellular cancers, intrahepatic cholangiocarcinomas are often treated the same way. For more, see What Is Bile Duct Cancer?

Fibrolamellar carcinoma
Fibrolamellar carcinoma (FLC) was once considered a subtype of HCC, but it's now thought of as a separate type of liver cancer. It is rare, and it most often develops in

women younger than age 35 (although it can also occur in older people). Often the rest of the liver is not diseased.

FLC is more likely to be removable by surgery than HCC.

Angiosarcoma and hemangiosarcoma

These are rare cancers that begin in cells that line the blood vessels in the liver. People who have been exposed to vinyl chloride or to thorium dioxide (Thorotrast) are more likely to develop these cancers (see Liver Cancer Risk Factors). The risk of these cancers is also increased by exposure to arsenic or radium and by a condition known as **hereditary hemochromatosis** (a genetic disorder of iron absorption). In about half of these cancers, no likely cause can be identified.

These tumors grow quickly and are usually too widespread to be removed with surgery by the time they are found. Chemotherapy and radiation therapy might help slow the disease, but it's usually hard to treat. These cancers are treated like other sarcomas. For more information, see What Is Soft Tissue Sarcoma?

Hepatoblastoma

This is a very rare cancer that develops in children, usually in those younger than 4 years old. The cells of hepatoblastoma are like fetal liver cells. About 2 out of 3 children with these tumors are treated successfully with surgery and chemotherapy, although the tumors are harder to treat if they have spread outside the liver.

Secondary liver cancer

Most often when cancer is found in the liver, it didn't start there. Many cancers that start somewhere else in the body, such as the pancreas, colon, stomach, breast, or lung, can spread (metastasize) to the liver. Cancer that has spread from its original (primary) site to the liver is sometimes called a **secondary** liver cancer.

These cancers are treated based on where they started. For example, cancer that started in a lung and spread to the liver is considered lung cancer, not liver cancer, and it is treated as lung cancer.

In the United States and Europe, secondary (metastatic) liver tumors are more common than primary liver cancer. The opposite is true for many parts of Asia and Africa.

For more on liver metastases from different types of cancer, see the specific cancer type, as well as Advanced Cancer.

Benign liver tumors

Benign (non-cancer) liver tumors sometimes grow large enough to cause problems, but they don't grow into nearby tissues or spread to distant parts of the body. If they need to be treated, they can usually be cured with surgery.

Hemangioma

The most common benign liver tumors, hemangiomas, start in cells lining blood vessels. Most liver hemangiomas don’t cause symptoms and don’t need treatment. But if they bleed or cause other problems, they may need to be removed with surgery.

Hepatic adenoma

Hepatic adenoma is a benign tumor that starts from hepatocytes (the main type of liver cell).

Most of these tumors don’t cause symptoms and don’t need treatment. Some eventually cause symptoms, such as pain or a lump in the abdomen (belly) or blood loss.

Doctors often advise surgery to remove the tumor, if possible, because there’s a risk that the tumor could rupture (leading to severe blood loss), as well as a small risk that it could eventually develop into liver cancer.

These tumors are more common in women than in men. Women have a higher chance of having one of these tumors if they take birth control pills, although this is rare. Men who use anabolic steroids may also develop these tumors. Adenomas may shrink when these drugs are stopped.

Focal nodular hyperplasia

Focal nodular hyperplasia (FNH) is a tumor-like growth made up of several cell types (hepatocytes, bile duct cells, and connective tissue cells). Although FNH tumors are benign, they might cause symptoms. It can be hard to tell them apart from true liver cancers, so doctors sometimes remove them when the diagnosis is unclear. FNH tumors are more common in women than in men.

Liver Cancer Risk Factors

A risk factor is anything that increases your chance of getting a disease, such as cancer. Different cancers have different risk factors. Some risk factors, like smoking, can be changed. Others, like a person's age or family history, can't be changed.

Having a risk factor, or even several risk factors, does not mean that you will get the disease. Some people who get the disease may have few or no known risk factors.

Several factors can increase a person's chance of getting hepatocellular carcinoma (HCC), the most common type of liver cancer.

Sex

Liver cancer is more common in men than in women. Much of this is probably because of behaviors affecting some of the risk factors described below.

Race/ethnicity

In the United States, Asian Americans and Pacific Islanders have the highest rates of liver cancer, followed by people who are Hispanic and Latino, American Indian and Alaska Native, African American, and White.

Chronic viral hepatitis

Worldwide, the most common risk factor for liver cancer is chronic (long-term) infection with hepatitis B virus (HBV) or hepatitis C virus (HCV). These infections lead to liver damage and are responsible for making liver cancer the most common cancer in many parts of the world.

HBV and HCV can spread from person to person through sharing contaminated needles (such as during IV drug use), unprotected sex, or childbirth. These viruses can also be passed on through blood transfusions, although this is very rare in the United States since blood products are tested for these viruses. In developing countries, children sometimes get infected with hepatitis B from prolonged contact with family members who are infected.

Other viruses, such as the hepatitis A virus and hepatitis E virus, can also cause hepatitis. But people infected with these viruses do not develop chronic hepatitis or cirrhosis and do not have an increased risk of liver cancer.

Symptoms of HBV and HCV infection

HBV is more likely to cause symptoms, such as a flu-like illness and jaundice (a yellowing of the whites of the eyes and skin). But most people recover completely from HBV infection within a few months. Only a very small percentage of adults become chronic carriers (and have a higher risk for liver cancer). Infants and young children who become infected have a higher risk of becoming chronic carriers.

HCV, on the other hand, is less likely to cause symptoms. But most people with HCV develop chronic infections, which are more likely to lead to liver damage or even cancer.

Cirrhosis

Cirrhosis is a disease in which liver cells become damaged and are replaced by scar tissue. People with cirrhosis have an increased risk of liver cancer. Most (but not all) people who develop liver cancer already have some evidence of cirrhosis.

There are several possible causes of cirrhosis. Most cases in the United States develop in people who drink a lot of alcohol or have chronic HBV or HCV infections.

Metabolic dysfunction-associated steatotic liver disease (MASLD)

Metabolic dysfunction-associated steatotic liver disease (MASLD), also known as non-alcoholic fatty liver disease (NAFLD), is a common condition in which fat builds up in the liver. This is more common in people with excess body weight. Some people with a subtype of this disease, known as **metabolic dysfunction-associated steatohepatitis (MASH)** or **non-alcoholic steatohepatitis (NASH)**, might go on to develop cirrhosis.

Primary biliary cirrhosis
Some types of autoimmune diseases that affect the liver can also cause cirrhosis. For example, in **primary biliary cirrhosis (PBC)** the bile ducts in the liver are damaged, which can lead to cirrhosis. People with advanced PBC have a high risk of liver cancer.

Inherited metabolic diseases
Certain inherited metabolic diseases can lead to cirrhosis.

For example, people with **hereditary hemochromatosis** absorb too much iron from their food. The iron settles in tissues throughout the body, including the liver. If enough iron builds up in the liver, it can lead to cirrhosis and liver cancer.

Heavy alcohol use
Heavy alcohol use is a leading cause of cirrhosis in the US, which in turn is linked with an increased risk of liver cancer.

Tobacco use
Smoking increases the risk of liver cancer. People who smoked and stopped have a lower risk than those who still smoke, but both groups have a higher risk than those who never smoked.

Excess body weight
Having excess body weight increases the risk of developing liver cancer. This is probably because it can result in MASLD and cirrhosis (see above).

Type 2 diabetes
Type 2 diabetes has been linked with an increased risk of liver cancer, usually in people who also have other risk factors such as heavy alcohol use and/or chronic viral hepatitis. This risk may also be increased because people with type 2 diabetes tend to have excess body weight, which in turn can cause MASLD and other liver problems.

Certain rare diseases
Diseases that increase the risk of liver cancer include:

- Tyrosinemia
- Alpha1-antitrypsin deficiency
- Acute intermittent porphyria
- Porphyria cutanea tarda
- Glycogen storage diseases
- Wilson disease

Aflatoxins
These cancer-causing substances are made by a fungus that can contaminate peanuts, wheat, soybeans, ground nuts, corn, and rice. Storage in a moist, warm environment can lead to the growth of this fungus. Although this can occur almost anywhere in the

world, it is more common in warmer and tropical countries. Developed countries, such as the US and those in Europe, test foods for levels of aflatoxins.

Long-term exposure to these substances is a risk factor for liver cancer. The risk is increased even more in people with hepatitis B or C infections.

Vinyl chloride and thorium dioxide (Thorotrast)
Exposure to these chemicals raises the risk of angiosarcoma of the liver (see What Is Liver Cancer?). It also increases the risk of developing cholangiocarcinoma (bile duct cancer) and HCC, but to a far lesser degree.

Vinyl chloride is a chemical used in making some kinds of plastics. Thorotrast is a chemical that in the past was injected into some patients as part of certain x-ray tests.

When the cancer-causing properties of these chemicals were recognized, steps were taken to eliminate them or minimize exposure to them. Thorotrast is no longer used, and exposure of workers to vinyl chloride is strictly regulated.

Anabolic steroids
Anabolic steroids are male hormones used by some athletes and other people to increase their strength and muscle mass. Long-term anabolic steroid use can increase the risk of liver cancer slightly. Cortisone-like steroids, such as hydrocortisone, prednisone, and dexamethasone, do not carry this same risk.

Signs and Symptoms of Liver Cancer

Signs and symptoms of liver cancer often do not show up until the later stages of the disease, but sometimes they may show up sooner. If you go to your doctor when you first notice symptoms, your cancer might be diagnosed earlier, when treatment is most likely to be successful.

Common symptoms of liver cancer
Some of the most common symptoms of liver cancer are:

- Weight loss (without trying)
- Loss of appetite
- Feeling very full after a small meal
- Nausea or vomiting
- An enlarged liver, felt as fullness under the ribs on the right side
- An enlarged spleen, felt as fullness under the ribs on the left side
- Pain in the abdomen (belly) or near the right shoulder blade
- Swelling or fluid buildup in the abdomen (belly)
- Itching
- Yellowing of the skin and whites of the eyes (jaundice)

- Fever
- Enlarged veins on the belly that can be seen through the skin
- Abnormal bruising or bleeding

People who have chronic hepatitis or cirrhosis might feel worse than usual or just have changes on lab test results, such as liver function tests or alpha-fetoprotein (AFP) levels.

Less common symptoms of liver cancer

Some liver tumors make hormones that act on organs other than the liver. These hormones may cause:

- High blood calcium levels (hypercalcemia), which can cause nausea, confusion, constipation, weakness, or muscle problems
- Low blood sugar levels (hypoglycemia), which can cause fatigue or fainting
- In men, breast enlargement (gynecomastia) and/or testicle shrinkage
- High red blood cell counts (erythrocytosis), which can cause someone to look red and flushed
- High cholesterol levels

Having one or more of the signs or symptoms above does not mean you have liver cancer. In fact, many of these signs and symptoms are more likely to be caused by other conditions. Still, if you have any of them, it's important to have them checked by a doctor so that the cause can be found and treated, if needed.

Tests for Liver Cancer

Some liver cancers can be found by testing people at high risk who don't have symptoms (known as screening), but most are found because they are causing symptoms. If you have signs or symptoms that might be from liver cancer, exams and tests will be done to find out for sure.

Medical history and physical exam

Your doctor will ask about your medical history to learn more about your symptoms and possible risk factors. Your doctor will also examine you to look for signs of liver cancer and other health problems, probably paying special attention to your belly and checking your skin and the whites of your eyes to look for jaundice (a yellowish color).

If symptoms and/or the results of your physical exam suggest liver cancer, you will probably need to have more tests . These might include imaging tests, lab tests, and/or biopsies of liver tissue. If liver cancer is found, tests might also be done to help learn more about the cancer, such as how far it has spread.

Imaging tests

Imaging tests use x-rays, magnetic fields, or sound waves to create pictures of the inside of your body. Imaging tests maybe done for a number of reasons both before and after a diagnosis of liver cancer, including:

- To help find areas that might be liver cancer
- To determine if an abnormal area is liver cancer
- To help a doctor guide a biopsy needle into an area that might be cancer and take a sample
- To learn how far cancer might have spread
- To help guide certain treatments in the liver
- To help determine if treatment is working
- To look for possible signs of cancer coming back after treatment

Ultrasound

Ultrasound is often the first test used to look at the liver. It uses sound waves and their echoes to create an image on a computer screen. This test can show tumors growing in the liver, which then can be tested for cancer, if needed.

In some medical centers, a special type of ultrasound known as **contrast-enhanced ultrasound (CEUS)** might be used to get a better look at a liver tumor. For this test, a type of contrast that contains very tiny bubbles (microbubbles) is given through an IV line just before the ultrasound exam is done. Sometimes a diagnosis of liver cancer can be made based on the way a liver tumor looks on CEUS, without the need for a biopsy.

Computed tomography (CT)

The CT scan uses x-rays to make detailed images of your body. A CT scan of the abdomen can help find many types of liver tumors. It can show the size, shape, and location of any tumors in the liver or elsewhere in the abdomen, as well as nearby blood vessels (known as **CT angiography** or **CTA**). Sometimes a diagnosis of liver cancer can be made based on the way a liver tumor looks on a CT scan, without the need for a biopsy.

CT scans can also be used to guide a biopsy needle into a tumor (called a **CT-guided needle biopsy**).

If you have liver cancer, you might also have a chest CT done to look for possible cancer spread to the lungs.

Magnetic resonance imaging (MRI)

Like CT scans, MRI scans provide detailed images of soft tissues in the body. But MRI scans use radio waves and strong magnets instead of x-rays.

MRI scans can be very helpful in looking at liver tumors. Sometimes a diagnosis of liver cancer can be made based on the way a liver tumor looks on an MRI, without a biopsy.

MRI can also be used to look at blood vessels in and around the liver to see any blockages (known as **MR angiography** or **MRA**). It can also show if liver cancer has spread to other parts of the body.

Bone scan

A bone scan can help look for cancer that has spread (metastasized) to bones. Doctors don't usually order this test for people with liver cancer unless they have symptoms such as bone pain, or if there's a chance they may qualify for a liver transplant to treat their cancer.

Biopsy

A biopsy is the removal of a sample of tissue to see if it is cancer. Sometimes, the only way to be sure of a liver cancer diagnosis is to take a biopsy sample and look at it in the pathology lab. But in some cases, doctors can be quite certain that a person has liver cancer based on the results of imaging tests such as CT and MRI scans (see above). In these cases, a biopsy may not be needed.

Doctors are often concerned that sticking a needle into the tumor to get a biopsy or otherwise disturbing it without completely removing it might help cancer cells spread along the needle's path. This is a major concern if surgery or a liver transplant might be an option to try to cure the cancer, as any spread of the cancer might make the person ineligible for a transplant. This is why some experts recommend that people who could be transplant candidates only have biopsies done at the center where the transplant will be done.

If a biopsy is needed, it can be done in several ways.

Needle biopsy: A hollow needle is put through the skin in the abdomen and into the liver. Local anesthesia (numbing medicine) is usually injected into the skin before the needle is placed. This type of biopsy is typically done with the help of an ultrasound or CT scan to guide the needle.

Laparoscopic biopsy: Biopsy samples can also be taken during a laparoscopy. This lets the doctor see the surface of the liver and take samples of abnormal-looking areas.

Surgical biopsy: An incisional biopsy (removing a piece of the tumor) or an excisional biopsy (removing the entire tumor and some surrounding normal liver tissue) can be done during surgery.

Lab tests of biopsy samples

If a biopsy is done, the samples will be sent to a lab, where they will be looked at with a microscope to see if they contain cancer cells. Other lab tests might be done on the samples as well.

For more information about biopsies and how they are tested, see Testing Biopsy and Cytology Specimens for Cancer.

Blood tests

Your doctor could order blood tests for a number of reasons:

- To help diagnose liver cancer (although the diagnosis can't be made on a blood test alone)
- To help determine what might have caused your liver cancer
- To learn how well your liver is working, which can affect what treatments you can have
- To see how well your other organs are working and general health, which also could affect what treatments you can have
- To see how well treatment is working
- To look for signs that the cancer has come back after treatment

Alpha-fetoprotein blood (AFP) test

AFP is a protein that can sometimes be found at high levels in the blood of people with liver disease, liver cancer (or some other cancers), and some other conditions.

If AFP levels are very high in someone with a liver tumor, it can be a sign that liver cancer is present. But many people with early liver cancer have normal levels of AFP, so high AFP levels aren't very helpful in determining if a liver mass might be cancer.

This test, however, is sometimes useful in people already diagnosed with liver cancer:

- The AFP level can help when determining treatment options.
- **During treatment**, the test can be used to give an idea of how well it is working, as the AFP level should go down if treatment is effective.
- **After treatment**, the test can be used to look for possible signs that the cancer has come back (recurred).

Other blood tests

Tests for viral hepatitis: Your doctor might order blood tests to check for hepatitis B and C.

Liver function tests (LFTs): Because liver cancer often develops in livers already damaged by hepatitis and/or cirrhosis, doctors need to know the condition of your liver before starting your treatment.

If the part of your liver not affected by cancer isn't working well, you might not be able to have surgery to try to cure the cancer, as the surgery might require removal of a large part of your liver. Other treatment options such as certain targeted therapy or chemotherapy may also not be good choices if your liver is not working well.

Blood clotting tests: The liver makes proteins that help blood clot when you bleed. A damaged liver might not make enough of these clotting factors, which could increase your risk of bleeding. Your doctor may order blood tests to help measure this risk.

Kidney function tests: Tests of blood urea nitrogen (BUN) and creatinine levels are often done to assess how well your kidneys are working.

Complete blood count (CBC): This test measures levels of red blood cells (which carry oxygen throughout your body), white blood cells (which fight infections), and platelets (which help the blood clot). It gives an idea of how well the bone marrow (where new blood cells are made) is functioning.

Blood chemistry tests and other tests: Blood chemistry tests check the levels of a number of substances in the blood, some of which might be affected by liver cancer. For example, liver cancer can raise blood levels of calcium, while blood glucose levels may fall. Liver cancer can also sometimes raise cholesterol levels, so this may be checked as well.

For more detailed information, see Exams and Tests for Cancer.

Can Liver Cancer Be Prevented?

Many liver cancers could be prevented by reducing exposure to known risk factors for this disease.

Preventing hepatitis B (HBV) and C (HCV) infections

Worldwide, the most significant risk factor for liver cancer is chronic infection with hepatitis B virus (HBV) and hepatitis C virus (HCV). These viruses can spread from person to person through contaminated needles (such as during IV drug use) and unprotected sex, so some liver cancers could be avoided by not sharing needles and by using safer sex practices (such as always using condoms).

Blood transfusions were once a major source of hepatitis infection as well, but blood banks in the United States test donated blood to look for these viruses, so the risk of getting a hepatitis infection from a blood transfusion is very low.

HBV vaccine

The US Centers for Disease Control and Prevention (CDC) recommend that all children and adults up to age 59, as well as older adults at risk for HBV, get the **HBV vaccine** to reduce their risk of chronic hepatitis B and liver cancer.

There is no vaccine to prevent HCV. Preventing HCV infection (as well as HBV infection in people who have not been immunized) is based on understanding and avoiding the ways in which these infections are spread.

Screening and testing for chronic HBV and HCV infections

It is possible for someone to have a chronic HBV or HCV infection and not know it. The CDC recommends that everyone 18 years of age or older get tested for HBV and HCV at least once and that some people get tested when they are younger and/or more often. (To learn who should get tested for HBV and HCV and how often, visit the CDC website)

Treating chronic HBV and HCV infection

If a person has a chronic HBV or HCV infection, treatment can help slow liver damage and reduce their risk of developing liver cancer.

Medicines to treat chronic HCV infection can eliminate the virus in many people and may lower their risk of liver cancer.

A number of drugs can be used to treat chronic HBV. They can reduce the level of viruses in the blood and lessen damage to the liver. Although these drugs don't cure the infection, they lower the risk of cirrhosis, and they may lower the risk of liver cancer as well.

Avoid or limit alcohol and tobacco use

Drinking alcohol can lead to cirrhosis, which in turn, can lead to liver cancer. Not drinking alcohol or drinking in moderation could help lower your risk of liver cancer.

Smoking also increases the risk of liver cancer, so if you smoke, quitting will help lower your risk of this cancer, as well as many other cancers and life-threatening diseases.

Get to and stay at a healthy weight

Staying at a healthy weight might be another way to lower your risk of liver cancer. People who have excess weight are more likely to have fatty liver disease and diabetes, both of which have been linked to liver cancer.

Limit exposure to cancer-causing chemicals

Changing the way certain grains are stored in tropical and subtropical countries could reduce exposure to cancer-causing substances such as aflatoxins. Many countries already have regulations to prevent and monitor grain contamination.

Treat diseases that increase liver cancer risk

Certain inherited diseases can cause cirrhosis of the liver, increasing a person’s risk for liver cancer. Finding and treating these diseases early in life could lower this risk. For example, all children in families with hemochromatosis (a genetic iron absorption disorder) should be screened for the disease and treated regularly if they have it.