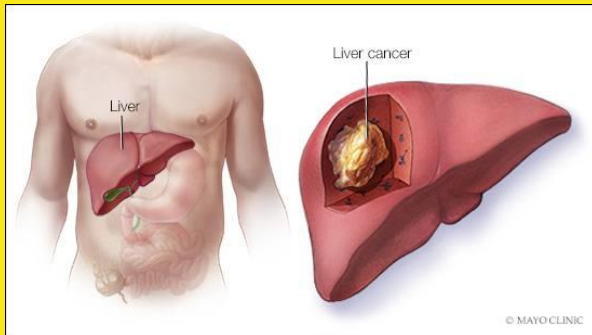


# Love Thy Liver, Live Cancer Free

## Team Tumor Busters

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Age Group: 10-13 years



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# Abstract

Liver Cancer is a tumor that starts in the liver and spreads to the rest of the body. **Hepatocellular Cancer (HCC)** is the seventh most common cancer and as of 2018 is the fourth leading cause of cancer-related death **worldwide**. Since there are no obvious symptoms, liver cancer is difficult to detect in early stages. This limits treatment options, leading to lower survival rates.

The aim is to learn more about Liver Cancer and spread awareness for signs and symptoms for early detection. Currently available treatment options require extensive medical treatment thus proving very costly.

**In conclusion** developing countries have almost 4x higher rate of liver cancer than developed countries. Liver cancer is most prevalent in Hispanics as compared to other races. Amongst all types of liver cancer HCV is the most fatal. Early detection and awareness is extremely important in treatment, higher survival rate and reduced medical treatment cost.

# What is Liver Cancer?

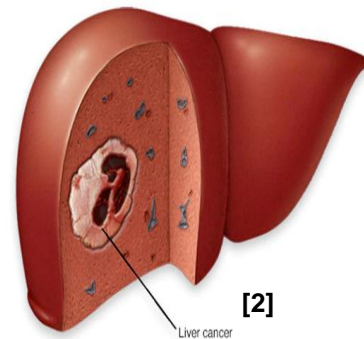


Primary Liver Cancers - has two types

**1. Hepatocellular carcinoma (HCC)**- The most common type of liver cancer in adults, starts as a small tumor and grows larger as time passes. During later stages of cancer the tumor will spread to other parts of the liver.

**2. Bile Duct** - Bile ducts are tubes that carry bile throughout the liver. Intrahepatic Bile Duct Cancer starts in the bile ducts that carry bile through the liver. The other form is Extrahepatic Bile Duct Cancer that starts outside the liver in the bile ducts that carry the bile to the gallbladder and small intestine.

Angiosarcoma and hemangiosarcoma are rare cancers which begin in the cells of the blood vessels in the liver. These tumor grow quickly and are too widespread to be removed surgically. **Hepatoblastoma** is a very rare cancer that develops in children under 4. This tumor is removed by surgery.



## Liver cancer

Liver cancer begins in the cells of the liver. The most common form of liver cancer begins in cells called hepatocytes and is called hepatocellular carcinoma.

# Secondary Liver Cancer

Secondary liver cancer is a metastatic liver cancer. It happens from cancer cells that come from primary cancers from around the body that goes to the liver, such as breast, colon, rectum, kidney, and the esophagus. Some cells break away from other cancers in the body in the bloodstream and starts a new tumor in the liver (this is secondary liver cancer). Most deaths come from secondary liver cancer rather than primary. Even if the primary cancer is removed, liver metastasis can still occur years later.

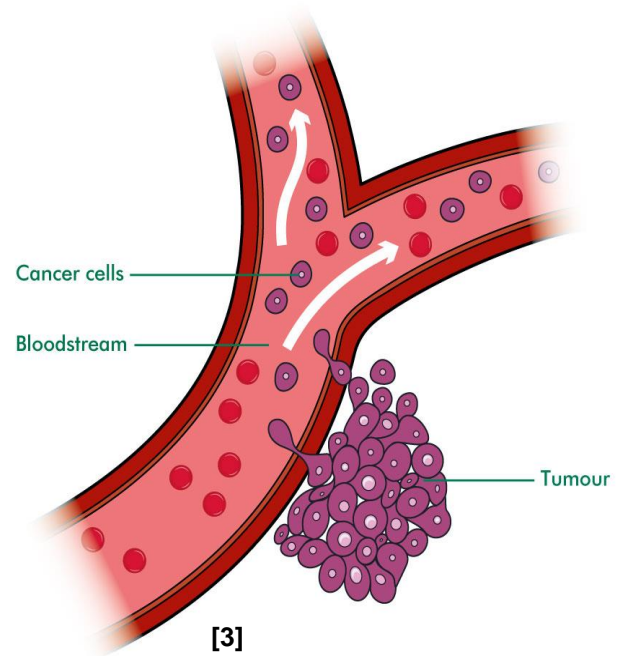


Image source: <https://www.macmillan.org.uk/information-and-support/liver-cancer-secondary/understanding-cancer/what-is-secondary-cancer-liver.html>

# Risk Factors for Liver Cancer

**Cirrhosis**-This causes scar tissue to form in the liver which increases the chances of developing liver cancer.

**Chronic hep B and hep C infections**-This infection leads into Cirrhosis, thus increasing the risk of liver cancer. Hep B goes straight to liver cancer.

**Excessive Alcohol Use**-Consuming more than a moderate amount of alcohol daily over many years can result in irreversible liver damage.

**Nonalcoholic fatty liver disease (NAFLD), obesity, and diabetes**-These conditions cause accumulation of fat in the liver which increases the risk of liver cancer.

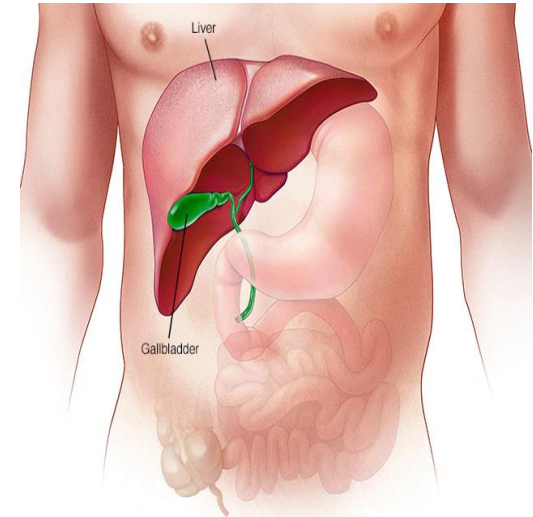
**Primary sclerosing cholangitis (PSC)**-This is a chronic disease which causes the narrowing of the bile ducts, it is one of the major causes of gallbladder cancer.

**Smoking**- Smoking increases the risk of liver cancer. The tobacco in cigarette weakens the body's immune system thus making it harder to fight cancer cells.

**Inherited Liver diseases** such as Wilson's Disease and Hemochromatosis can lead to liver cancer.

# Signs and Symptoms

- **Jaundice- Yellowing of the skin and eyes.**
- **White stools.**
- **Nausea/vomiting.**
- **Enlarged liver** (fullness under ribs on the right side).
- **Enlarged spleen (fullness under ribs on left side).**
- **Swelling in the abdomen, and itching.**
- People with **chronic hepatitis or cirrhosis**
- **Fever, enlarged veins on the belly, and abnormal bruising/bleeding.**
- **Weight loss (without trying to), pain in the stomach near the right shoulder and loss of appetite.**
- Some liver tumors affect other organs in the body which may cause hypercalcemia, hypoglycemia, erythrocytosis, and high cholesterol levels. This is along with severe abdominal pain.



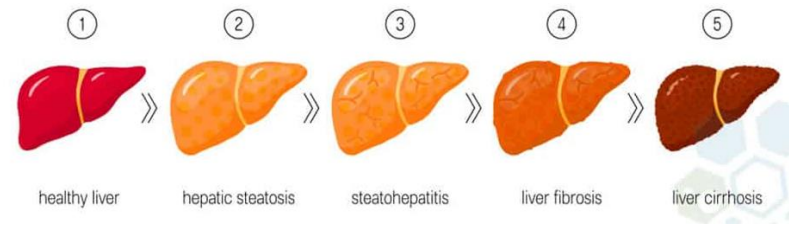
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# Stages of Liver Cancer

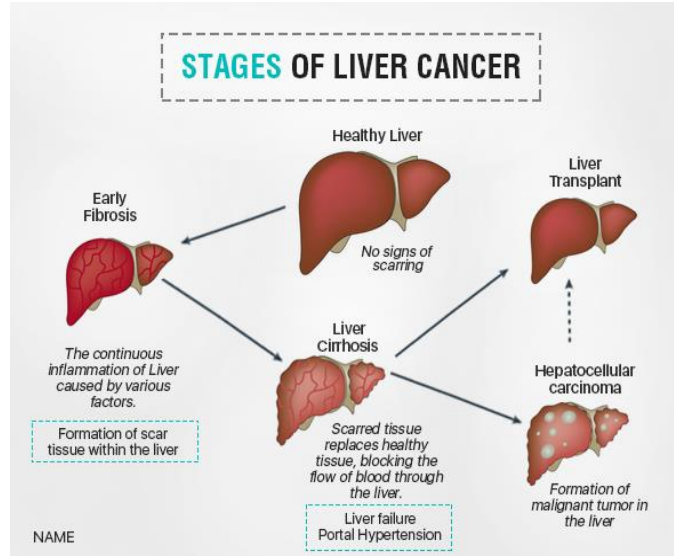
**Stage 1**-Single mass in the liver that has not spread to any of the blood vessels.**Stage 2**-A single mass in the liver that has invaded blood vessels, or, multiple tumors (< 5cm)are in the liver. **Stage 3 - 3A**- Multiple tumors in the liver and at least one is > 5 cm. None of the tumors have spread to the lymph nodes or areas outside the liver. **3B**-The cancer has spread to one of the main blood vessels (Hepatic veins). **3C**-The tumor has spread to nearby organs, or at least one tumor has extended in the outer layers of tissue.

**Stage 4 - 4A**-Tumors of any size have spread to lymph nodes near the liver. **4B** - The tumor has spread to distant organs (lungs, bones, or brain). Nearly impossible to cure.

STAGES OF LIVER DAMAGE [5]

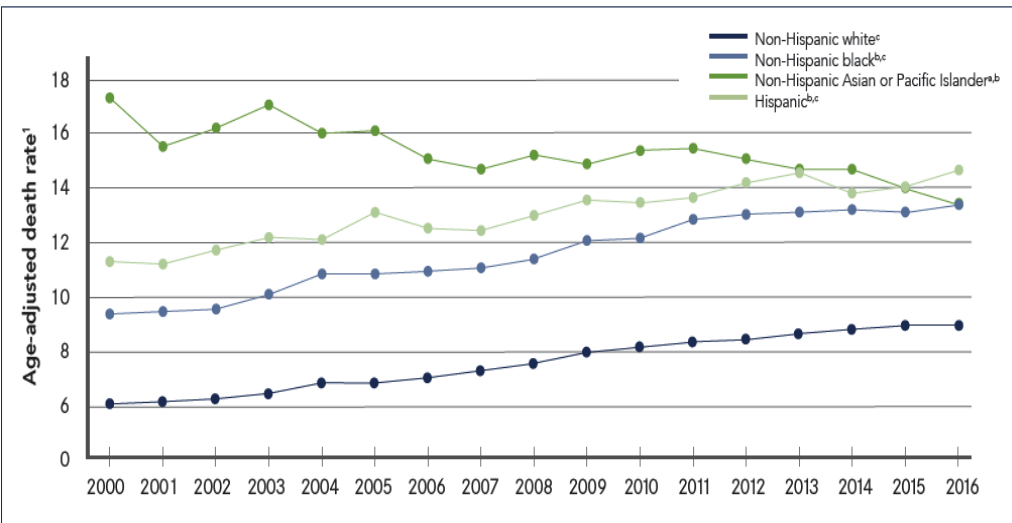


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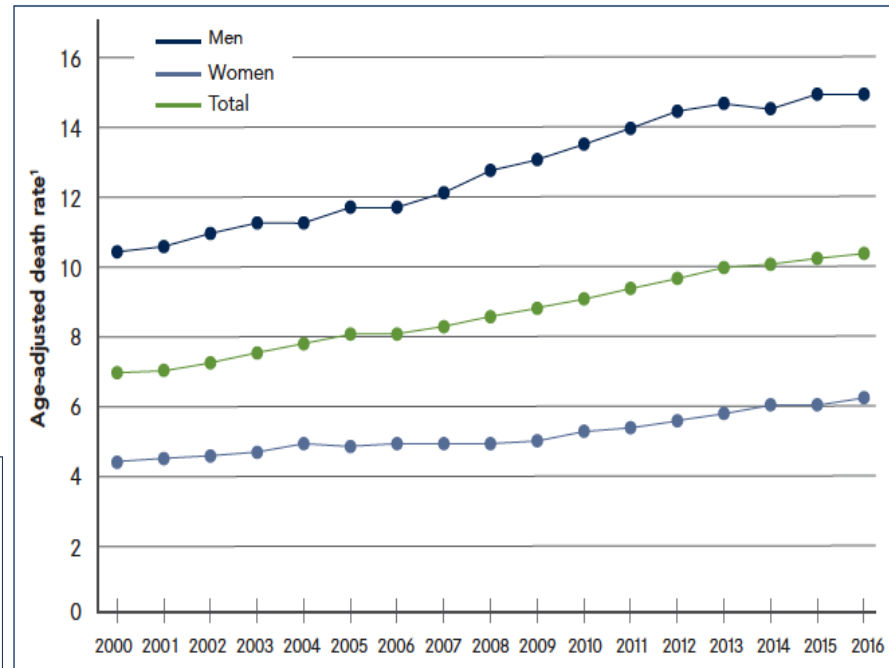


# Increase in Liver Cancer

Liver cancer death rates increased by 43% in men from 2000 to 2016 and by 40% in women.



<sup>a</sup>Significant decreasing trend for non-Hispanic Asian or Pacific Islander adults from 2000 to 2016 ( $P < .05$ ). <sup>b</sup>Significantly higher compared with non-Hispanic white adults throughout the period ( $P < .05$ ). <sup>c</sup>Significant increasing trend from 2000 to 2016 ( $P < .05$ ). Deaths per 100,000 US standard population aged 25 years and older. [7]



<sup>1</sup>Deaths per 100,000 US standard population aged 25 years and older. Source: National Center for Health Statistics, National Vital Statistics System, Mortality. [8]

Liver cancer death rates decreased by ~ 25% among Asians from 2000 to 2016.



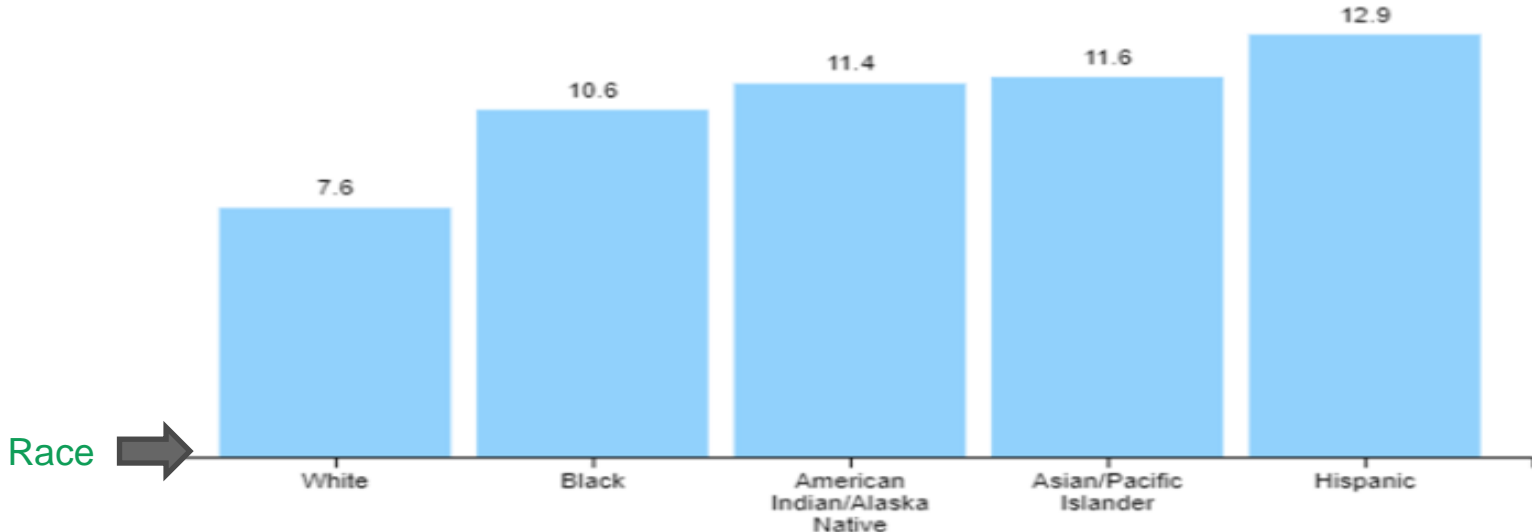
# Liver Cancer In U.S., Women vs Men

- Men are about 3 times more likely than women to be diagnosed with the disease.
  - As of January 2019, about 42,030 adults will be diagnosed with liver cancer, in that being 29,480 men and 12,550 women.<sup>[9]</sup>
  - It is estimated that 31,780 deaths (21,600 men and 10,180 women) from this disease will occur this year. For men, liver cancer is the fifth most common cause of cancer death. It is the seventh most common cause of cancer death for women.
- Since 1980, incidence of liver cancer has tripled.
  - Between 2006 and 2015, the number of people diagnosed with the disease increased by approximately 3% annually.
- The general 5-year survival rate is 18%. Survival rate depends on several factors, including the stage of the disease.

# Liver cancer and Race/Ethnicity

## Rate of New Cancers by Race/Ethnicity, Both Sexes

Liver and Intrahepatic Bile Duct, United States, 2016



Rate per 100,000 people

Data source – U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease [10]

# Liver Cancer Across The World

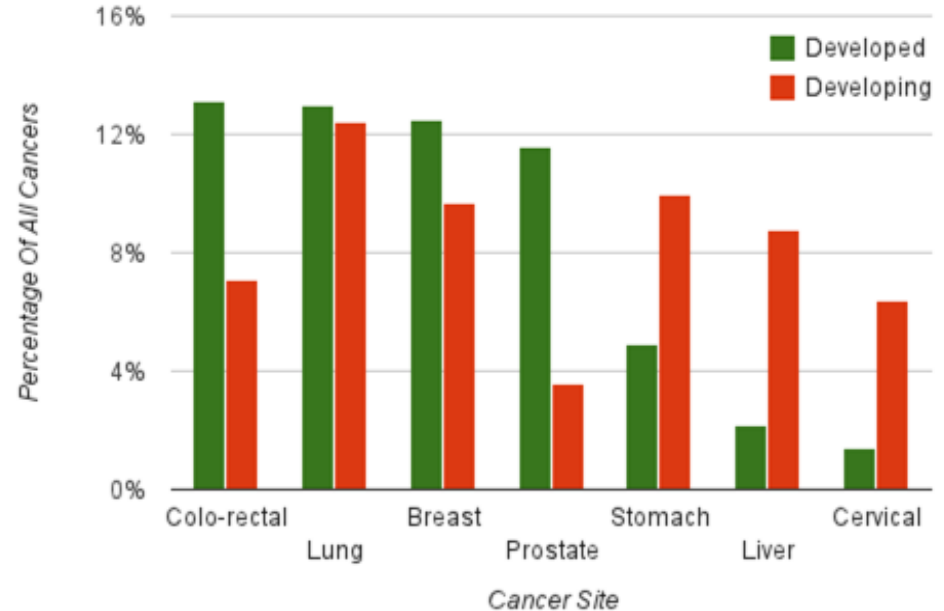
Liver cancer is the sixth most common cancer worldwide.

- About 83% of liver cancer cases occur in less developed countries, with the highest incidence of it in Asia and Africa
- The top 25 countries who have the most people diagnosed with liver cancer are (Mongolia, Egypt, Gambia, Vietnam, Laos, Cambodia, Guinea, Thailand, China, South Korea, North Korea, Ghana, Liberia, Guatemala, Guam, Moldova, Burkina Faso, Vanuatu, Senegal, Singapore, Papua New Guinea, Guinea-Bissau, Philippines, Mauritania, Cape verde). This list goes in order from the most diagnosed to the least in the top 25 countries in 2018.

# Developed vs Developing Countries

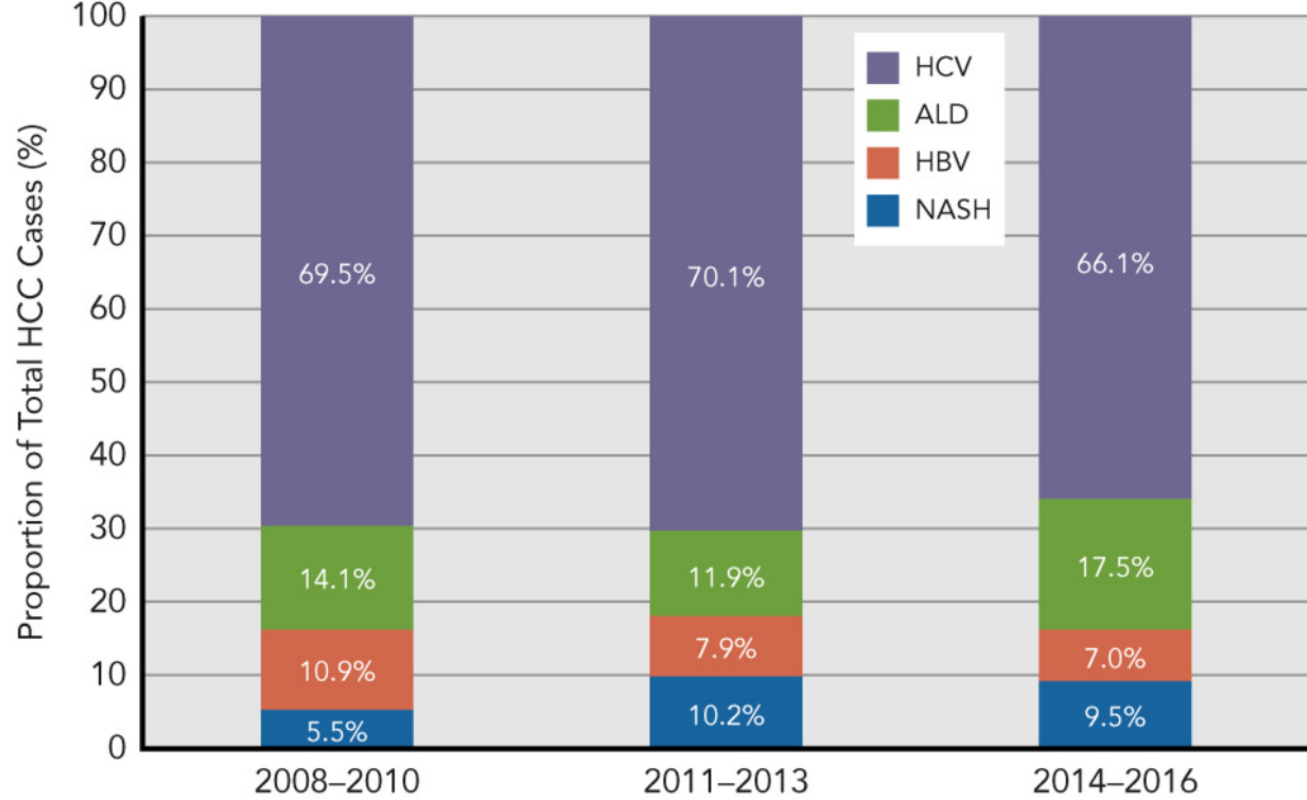
- Developing countries such as **Mongolia and Sub-Saharan Africa** have the highest rates of liver cancer in the world. Mongolia tops the list.
- Liver cancer spreads easily in the developing countries.
- Liver cancer rates are 4 times higher in developing countries compared to developed countries.
- Other cancers such as Breast Cancer are higher in developed countries.

Proportion of Cancers By Site  
Developed Vs Developing Countries [12]



# Liver Cancer and Death

Number of deaths caused by different types of HCC liver cancers from 2008-2016<sup>[13]</sup>



**HCV** : Hepatitis C Virus

**ALD**: Alcohol Related Liver Disease

**HBV**: Hepatitis B Virus

**NASH**: Nonalcoholic Steatohepatitis

# Liver Cancer Prevention

There are many ways to prevent liver cancer and here are some of the ways.

- You should get vaccinated for Hepatitis B virus.
- You should avoid and treat hepatitis C infections by avoiding taking drugs and getting check ups for hepatitis C.
  - If you are at risk of hepatitis B or C infection, you might want to think about undergoing a screening test.
- Avoid alcohol and tobacco use.
- Get to a healthy weight and stay on that weight. People who are obese are more likely to have fatty liver disease and diabetes which are both linked to liver cancer.
- You also have to avoid using and ingesting cancer-causing chemicals like Aflatoxins and Vinyl Chloride.

# Detecting Liver Cancer

People who have previously had liver problems like Cirrhosis and Hepatitis B and C are encouraged to go in for regular liver screening test.

Liver Cancer can be detected in the following ways:

- **Blood tests:** Blood test may reveal liver problems and tumors.
- **Imaging tests:** Imaging tests provide a picture of the inside of the body that the doctors use to determine whether you have a tumor in the body. Imaging tests are ultrasound, CT scan, and MRI.
- **Liver Biopsy:** A liver biopsy is taking out a piece of liver tissue to examine if there is a tumor or abnormalities in the liver.

# Treatments For Liver Cancer

There are many treatments for liver cancer such as:

- **Surgery** - Removal of tumor by cutting open the body
- **Ablation** - Using probes to “burn” or “freeze” the liver cancer cells
- **Embolization** - Procedure that injects substances directly into an artery in the liver to block or reduce the blood flow to a tumor in the liver.
- **Radiation therapy** - Procedure that uses high energy rays to kill cancer cells
- **Targeted therapy** - A drug used to treat liver cancer that targets specific defects found only in cancer cells
- **Chemotherapy** - An anticancer drug that kill cancer cells but may affect normal blood cells
- **Immunotherapy** - Drug that helps person’s own immune system find and destroy cancer cells



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