Liver Tumors

Treatment options

About the Liver

Your liver is the largest organ in your abdomen. It sits under your heart and lungs on the right side of your body, partially covered by your rib cage. Your liver is vital to your survival. It produces hormones, blood-clotting factors, and bile, which helps your body metabolize (change sources of energy into actual energy) the foods you eat. It also breaks down drugs, toxins, and other substances.

Your liver is connected to your biliary system, which is made up of your bile ducts and gallbladder. The bile in your liver travels through the bile ducts into your intestines to help digest the fats you eat. Between meals, bile is stored in your gallbladder.

The numbers on the illustrations that follow show the 8 different segments of the liver. Each segment has its own blood flow and bile drainage. Because of this, individual segments can be removed without damaging other segments. See “Surgical Resection” on page 4 for more information.
Tumors

*Tumor* is the Latin word for “swelling.” *Neoplasm* is the Greek word for “new growth.” A tumor, or neoplasm, is abnormal tissue that is formed by a new growth of cells. A tumor may also be called a lesion. There are 3 types of tumors: benign, premalignant, and malignant.

**Benign Liver Tumors**

Benign tumors cannot invade or metastasize (spread) to other areas. They do not lead to cancer, but they sometimes can cause symptoms that require treatment. The most common benign liver tumors are:

- **Hemangioma** – an abnormal growth of blood vessel cells
- **Focal nodular hyperplasia (FNH)** – an abnormal growth of liver cells, with malformed bile ducts and vessels
- **Simple cyst** – a sac (pouch) filled with fluid
- **Biliary hamartoma** – an abnormal formation of bile duct cells

**Premalignant Liver Tumors**

Premalignant tumors are benign when they are found, but they can become malignant. The most common premalignant tumors are:

- **Adenoma** – an abnormal growth of cells related to contraceptives that contain estrogen. Adenomas can bleed or become liver cancer.
- **Biliary cystadenoma** – a cyst-like mass formed from bile duct cells.
- **Choledochal cyst** – a widening of the bile ducts that can cause a bile duct infection called cholangitis.
Biliary cystadenomas and choledochal cysts can turn into *cystadenocarcinomas* or *cholangiocarcinomas*, which are both malignant liver tumors.

**Malignant Liver Tumors**

Malignant tumors are cancers. They grow uncontrollably and invade and destroy normal tissues. They can also metastasize, spreading to other organs through the lymph or blood vessels.

There are 2 types of malignant liver tumors: primary and secondary. Primary liver tumors form directly from liver tissue. Secondary liver tumors metastasize from cancers in other organs such as the colon, rectum, lung, or breast. In the U.S., most malignant liver tumors (70% to 80%, or 70 to 80 out of 100) are secondary.

The most common primary liver malignancies are:

- *Heptocellular carcinoma (HCC)* – the most prevalent primary liver tumor, often called “liver cancer.” HCC is often a result of chronic liver disease such as *cirrhosis*, from hepatitis B or C, or from exposure to large amounts of alcohol. *Fibrolamellar* is an HCC that does not arise from liver disease. This neoplasm is seen more often in younger people.
- *Cholangiocarcinoma* and *gallbladder cancer* – 2 primary cancers of the biliary system.
- *Cystadenocarcinoma* – a rare type of liver cancer that can result from a biliary cystadenoma.

Other cancers can form in the liver, but they are very rare. Three of these are *epithelial hemangioendothelioma*, *PEComa*, and *angiosarcoma*.

*Sarcomas* are cancers that form in connective tissues such as muscles, nerves, and fibers. It is rare for sarcomas to metastasize to the liver from other parts of the body, or for them to arise naturally within the liver.

**Treating Liver Tumors**

There are many ways to treat liver tumors, and you may be advised to have a combination of treatments. Your health care providers will consider many factors in planning your treatment: your overall health, the health of your liver, what type of tumor you have, and how advanced your disease is. UWMC’s Multidisciplinary Liver Tumor Clinic, a team of medical specialists, will consider these factors and develop an individualized treatment plan for you based on your specific situation. Your treatment may be simple or very complex.
Here are some of the treatments your health care team might recommend for you:

**Surgical Resection**

*Surgical resection* is an operation to remove the part of the liver or bile duct where the tumor is, plus tissue around the edges of the tumor. The goal is to leave no cancer cells behind. Depending on the location of the tumor and the amount of liver that needs to be removed, *laparoscopic* surgery may be an option. Laparoscopic surgery is a minimally invasive method where only small incisions are made, and the operation is done with small instruments that are inserted through these incisions. This procedure results in less pain and a shorter recovery time.

Surgical resection is possible because of the liver’s ability to regenerate. Up to 80% of the liver can be removed when the rest of the liver is healthy. The liver can usually grow back to its original size in 2 to 4 weeks after surgery. When cirrhosis is present, the liver cannot regenerate very well, if at all, and resection must be limited or sometimes avoided.

**Portal Vein Embolization**

*Portal Vein Embolization* (PVE) is a minimally invasive procedure that can be used to make surgical resections safer when a large amount of liver needs to be removed. It is done by *Interventional Radiology* (a branch of Radiology that does procedures) to block the portal vein that supplies blood to the side of the liver that will be removed. This causes the *embolized* (blocked) side of the liver to shrink, and the other side to grow, before the surgical resection. PVE can be used in patients with *cirrhosis* and those receiving chemotherapy. It can be done both to assess whether it is safe to do a liver resection, and to improve a patient’s recovery after surgery.

**Hepatic Arterial Infusion Pump Placement**

*Hepatic Arterial Infusion Pump* (HAIP) placement is an operation that places a *catheter* (a thin, flexible tube) in the hepatic artery. The catheter delivers high doses of chemotherapy from a special pump reservoir. The main advantage of this pump is that it can deliver strong doses of chemotherapy with fewer side effects, since the liver *detoxifies* (removes the harmful effects of) the chemotherapy.

HAIP may be used when there is a *high tumor burden* (many scattered tumors or 30% of the liver volume is invaded by tumor), or if there is a high risk of the tumor growing back. It may be done before surgical resection, but it is usually not used to treat liver tumors by itself.
Liver Transplantation

In a liver transplant operation, a patient’s diseased liver is completely removed and replaced with a liver from another person. University of Washington Medical Center (UWMC) is the only hospital doing liver transplants in the 5-state region of Washington, Wyoming, Alaska, Montana, and Idaho.

When liver transplantation is used to treat cancer, it is usually to treat HCC. Very rarely, it is used to treat selected cases of cholangiocarcinoma, epithelioid hemangioendothelioma, and other less common neoplasms. To be able to be successful in treating HCC, the tumor must not go beyond the liver, and it must meet the Milan criteria. This criteria requires that there is only 1 tumor up to 5 cm in size or there are 3 or fewer tumors, and none are larger than 3 cm in size.

UWMC has 2 treatment protocols: a down-staging protocol and an extended protocol. These treatments try to shrink the tumor (or tumors) to make them fit the Milan criteria, allowing for transplantation. UWMC may select patients with severe cirrhosis for transplant, based only on their liver disease. We select transplant patients carefully to ensure the best possible results.

Most donor livers are from patients who have recently passed away (cadaveric transplants). In rare cases, living-related donor transplants can be done, but UWMC currently does only cadaveric transplants.

Radiofrequency Ablation

In Radiofrequency Ablation (RFA), electrical currents similar to radio waves are passed between a needle electrode and grounding pads placed on the patient's skin. These currents create heat around the electrode, which is directed into the tumor to heat and destroy the cancer cells. These dead tumor cells are slowly replaced by scar tissue that shrinks over time.

RFA can be used on tumors up to 5 cm in size, although best results are seen for tumors smaller than 3 cm. It is generally done when there are 3 or fewer tumors. RFA requires general anesthesia, and it is done in one of these ways:

- **Open surgery** – for patients who will be having another procedure at the same time or who have severe scar tissue from a previous surgery.
- **Laparoscopy** – a minimally invasive procedure that uses small abdominal incisions and a scope.
- **Thoracoscopy** – a minimally invasive procedure that is done through the chest cavity.
• **Percutaneous** – The electrode is inserted through the skin and into the tumor without incisions. The electrode is usually guided by real-time ultrasound, but CT scan can also be used.

The type of RFA used is based on where the tumor is located, how close it is to other organs, whether the patient has had abdominal surgery before, and if the patient also needs other procedures.

**Percutaneous Ethanol Injection**

*Percutaneous Ethanol Injection* (PEI) is an ablation therapy similar to RFA, but it uses alcohol instead of heat to kill the tumor cells. PEI does not require general anesthesia, and is usually done for HCC tumors that are less than 2 cm in size.

**Chemoembolization**

*Chemoembolization* is also called *Trans-Arterial Chemo Embolization* (TACE) or *Hepatic-Arterial Chemo Embolization* (HACE). This therapy uses a catheter-based treatment to take advantage of the fact that tumors receive their blood mostly through the *Hepatic Artery* (HA).

This HA blood supply to the tumor(s) is targeted in TACE/HACE. Guided by *fluoroscopic X-rays*, which makes the liver visible on a screen, the Interventional Radiologist directs the catheter into the HA. A contrast solution is injected through the HA branches to make the tumor’s blood supply easy to see. The tumor can then be treated in one of these ways:

• **Bland embolization** – Small embolic beads are used to block off the HA blood vessel branches, cutting off the tumor’s blood supply.

• **Chemoembolization** – Chemotherapy is injected into the HA blood vessel branches along with the embolic beads. This traps the chemotherapy in the tumor and blocks off the blood supply to the tumor. Both procedures can be repeated if needed.

TACE cannot be used in patients who have significant heart disease or patients whose liver function is poor.

**Radioembolization**

*Radioembolization* (Y90) is a catheter-based therapy like TACE, but the embolic beads contain a radioactive substance called Yttrium-90 isotope. As in TACE, these beads cut off the HA blood supply to the tumor. But, instead of delivering chemotherapy drugs to the area, they emit radiation directly at the tumor cells to kill them.
Radiation

External Beam Radiation, also called Intensity-Modulated Radiation therapy (IMRT) uses advanced computer simulation to deliver the radiation dosage in a special way. IMRT protects the areas of the liver that do not contain a tumor, as well as the healthy surrounding tissue from the radiation.

Chemotherapy

In chemotherapy, chemical or biologic agents are used to kill or prevent cancer cells from growing. These agents are called:

- Cytotoxic, if they are designed to kill the tumor cells
- Cytostatic, if they are designed to limit tumor growth
- Targeted, if they recognize specific targets such as growth factors (proteins that promote tumor growth)

Chemotherapy can be used for many purposes:

- Palliative chemotherapy is used to control tumor growth and extend life where a cure is not possible.
- Adjuvant or postoperative chemotherapy is used to prevent recurrence after surgery or after another procedure meant to cure the cancer is done.
- Neoadjuvant or preoperative chemotherapy is used to shrink the tumor before surgery or before other procedures that are meant to cure the cancer. The goal is to increase the success of the surgery or procedure that will be done.
- Consolidation chemotherapy is used after the patient goes into remission. It is done to keep the patient cancer-free.

The chemotherapy regimen and the chemotherapy drug type and dosage depend on the type of tumor and the patient’s ability to tolerate the chemotherapy without side effects.

Palliative Care

Palliative, or supportive care, is an important treatment option for patients whose tumor is too advanced to be treated effectively. It is also an option for patients who are too sick to tolerate treatment or who do not want further treatment. Palliative care does not focus so much on the tumor itself, but on avoiding the negative effects of the tumor, such as pain, nausea, and cachexia (loss of weight, fatigue, and weakness).

The goal of palliative care is to make the patient as comfortable as possible. This type of care also involves emotional, psychiatric, and spiritual support services for both the patient and the patient’s family.
Your Questions

Your questions are important. Use this space to write down questions you want to ask at your doctor visit:

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Or, if you would like to speak with someone right away:

Weekdays from 8 a.m. to 4 p.m., call the Surgical Specialties Nurse Advice Line at 206-598-4549.

After hours and on weekends and holidays, call 206-598-6190 and ask for the resident on call for Surgery to be paged.