Liver Cancer (Hepatocellular Carcinoma or HCC) Overview

Recent advances in liver cancer care seek to address the rising incidence of liver cancer, which has steadily increased over the past three decades. At the UMC Center for Transplantation, our team sees individuals with both hepatocellular carcinoma (primary liver cancer) and metastatic liver lesions. Current treatment options include surgical removal of tumors, the application of chemotherapy and radiation into the liver, and systemic chemotherapy treatments.

Tumor Detection

Liver cancer may be hard to detect. Most patients are asymptomatic. For this reason, physicians advise screening high-risk patients periodically.

Surveillance tools for HCC include ultrasound and the alphafetoprotein (AFP) blood test. AFP is a protein produced by the liver. An elevated level can indicate tumor growth, though some patients with liver cancer have normal AFP levels. For patients with abnormalities in these tests, an evaluation with a contrast-enhanced CT or MRI is recommended to determine if cancer is present.

If patients develop symptoms, the first is usually pain in the right side of the abdomen. Weight loss is common and sometimes patients have episodes of severe pain, fever, and nausea. Rapidly deteriorating health, weakness, swelling, and jaundice may also imply HCC.

Determining the Size, Stage and Scope of a Liver Lesion

Once blood tests reveal an elevated AFP level or an ultrasound shows a lesion in the liver, patients should undergo further evaluation to determine if liver cancer is present and to assess for size and number of tumors. This preoperative evaluation includes the diagnosis and localization of the lesion, staging, and a determination of treatment options. UMC uses a variety of techniques to help determine the location and stage of HCC. Diagnostic imaging procedures are the most accurate methods. In some cases, a liver biopsy is required to determine the type of liver tumor.

Diagnostic Imaging

At UMC, liver imaging may include a four-phase computed tomography (CT), including spiral CT scans obtained during hepatic arterial and portal venous phases following intravenous contrast administration. Imaging also involves state-of-the-art magnetic resonance imaging (MRI). These techniques can accurately demonstrate the number of primary tumors within the liver and their relationship to vascular structures. Doppler ultrasound can be used as a complementary imaging technique. FDG positron emission tomography (PET) is occasionally helpful in characterizing atypical hepatic masses as well as in detecting extrahepatic malignancy.

Metastatic Work-Up

Patients with HCC require a metastatic work-up to determine if cancer has spread to surrounding tissue. This work-up includes a chest CT scan and a nuclear medicine bone scan. After treatment, patients should continue to be staged every three to six months with chest/abdomen CT and bone scans.

Surgical Interventions for Liver Cancer

When determining treatment options for hepatocellular carcinoma (HCC), our team evaluates the lesion imaging and lab results, along with the patient’s age, liver function, and overall health to recommend appropriate treatment options. Because choosing a treatment plan is an important decision, we review all options with patients and their families, explaining the benefits and disadvantages of each.

Some patients may require liver biopsy to determine surgical candidacy, since advanced liver scarring or cirrhosis limit the ability to safely perform surgery to remove the tumor.
Ablation
Some patients are not candidates for resection due to inadequate liver reserve, large or multiple lesions in multiple lobes, or cirrhosis. These patients may benefit from minimally invasive ablation therapy. This therapy uses extreme heat to destroy liver tumors.

The ideal patient for ablation generally has no more than three lesions that are no greater than 5 cm in size. Ablation delivers radiofrequency energy to the tumor, heating it to temperatures above 113º F, thereby destroying the lesion. This technique can be performed either by an interventional radiologist or by a surgeon, depending on the lesion’s size and location.

Systemic Chemotherapy
Systemic chemotherapy uses a mixture of anti-cancer drugs injected into a vein or taken by mouth. Typically, this alternative is reserved for patients with metastatic disease or those who are not candidates for other procedures. Depending on any underlying disease, different drugs are applied. Patients are always encouraged to seek out and participate in clinical trials, which offer hope and help us learn how to better care for patients with this disease.

Metastatic Liver Lesions Diagnosis and Treatment

Overview of Metastatic Liver Lesions

Many recent advances in medicine and surgery have made it possible to successfully treat cancers that were previously considered incurable. At UMC Center for Transplantation, these advances have been incorporated into a multidisciplinary approach that can offer treatment for most patients who have developed metastatic liver lesions from malignant tumors, such as colon cancer or breast cancer. Our team of specialists will work with you to provide a comprehensive treatment plan that includes the latest technology in diagnosis and treatment.

What are Metastatic Liver Lesions?

Cancer can develop in any organ and each cancer acts differently in its tendency to spread to other organs. When a cancer has spread to the liver, it is referred to as a metastatic liver lesion. Sometimes the metastatic lesion is identified at the same time as the original cancer (synchronous) and sometimes the metastatic lesion is discovered later, after the original cancer has been treated or surgically removed (metachronous).
The liver is the most common site for metastasis from gastrointestinal cancers, such as colon cancer or pancreatic cancer.

**Detecting and Staging Metastases**

When cancer has spread to the liver, it typically does not cause any symptoms. As a result, most patients do not notice any change in their health. Blood tests and imaging, such as CT scan or ultrasound, are important tools to detect metastatic liver lesions at an early stage, when they are most effectively treated. These tests can also be helpful in determining if the cancer has spread to areas in addition to the liver. In some patients additional testing, such as a positron emission tomography (PET) and MRI scan may be required to determine the extent of the liver metastases.

![CT scan images of the liver with metastatic lesions.](image)

**Treatment Options for Metastatic Liver Lesions**

Once a metastatic liver lesion is detected, patients should undergo a rapid medical, oncologic and surgical evaluation to determine the most appropriate treatment. The treatment may vary between patients, and will be tailored to best fit each individual's specific needs. Frequently, combinations of treatments, rather than a single type of treatment will be required, and you will meet with a team of specialists to discuss these different options during your evaluation.

**Chemotherapy**

*Systemic Chemotherapy*  
The most common treatment used for metastatic liver lesions is systemic chemotherapy. In this treatment, anti-cancer medications may be delivered intravenously or by ingestion of an oral preparation containing the anti-cancer drug.

Cancer cells vary widely in their response to systemic chemotherapy. Some cancers respond well to chemotherapy, while others may be unaffected. This type of treatment is commonly offered for patients who have large malignant tumors that cannot be removed surgically, or patients who have cancer spread to other organs in addition to the liver.

**Surgery**  
Surgical resection involves removing a portion of the liver that contains the metastatic lesion. This treatment is reserved for patients with no underlying liver disease (such as cirrhosis), and who are otherwise healthy enough to withstand a major operation.

Surgeons can remove as much as 70 percent of the liver in attempting to remove cancerous lesions, since the liver possesses the ability to regenerate after surgical resection. The liver will typically replace the removed liver volume within several weeks after surgical resection.

In patients with metastatic liver lesions localized to one anatomic region of the liver, surgical resection offers the best chance for cure. Only a physician or surgeon experienced with the treatment of metastatic liver lesions can determine if surgical resection is right for you.
Overview of Non-Cancerous Liver Lesions

Masses within the liver are increasingly being detected inadvertently when patients are evaluated for unrelated reasons. These liver masses are usually benign (non-cancerous) in patients without underlying liver disease and usually need no specific treatment. We recommend that the work-up and management of benign lesions be overseen by our multidisciplinary team including radiologists, gastroenterologists, oncologists and surgeons, to ensure a patient receives the best possible care.

Benign masses can be categorized into two groups: solid or cystic (fluid filled).

Solid Masses

Among the most common solid masses include:

- Hemangioma
- Focal nodular hyperplasia
- Adenoma
- Focal fatty change
- Nodular regenerative hyperplasia

Hemangiomas are the most common of all benign liver masses. They are more prevalent in women and may be affected by hormonal changes. Symptoms such as pain are mostly noted in lesions less than 6 cm and are related to compression of adjacent structures. Bleeding is rare. Diagnosis of these lesions is usually made radiologically with magnetic resonance imaging (MRI) offering the most definitive means of diagnosis. No specific treatment is required for asymptomatic lesions whatever the size. Surgical resection is the treatment of choice for symptomatic lesions.

![Hemangioma](image)

Focal Nodular Hyperplasia (FNH) is the second most common benign lesion of the liver. It is usually asymptomatic and has no malignant potential or risk of rupture. Symptomatic lesions are usually larger and cause compression of adjacent structures. Laboratory studies are usually normal and diagnosis is made radiologically. At times a biopsy may be needed. Surgical resection is indicated only if the diagnosis is of question or the patient is symptomatic.
**Adenomas** are a rare entity and have a strong association with oral contraceptive use. Larger adenomas (less than 5 cm) may present with abdominal discomfort or a feeling of fullness. Other symptoms include nausea, vomiting and fevers. Larger lesions have a tendency to bleed (40%) and have a potential to become cancerous (10%). Diagnosis of these lesions is made by a combination of radiographic examinations and sometimes biopsy. Treatment consists of first discontinuing oral contraception use, to see if the mass regresses. Additionally, all lesions greater than 4 - 5 cm or where malignancy cannot be excluded should be surgically resected.

**Focal Fatty Change** occurs when fat distribution within the liver is not evenly spread. Areas of increased fat accumulation are referred to as focal fatty change. Patients who have a history of diabetes, obesity, hepatitis C or malnutrition may be predisposed to this condition. Individuals are usually asymptomatic. These lesions are diagnosed by radiographic examination (MRI) and at times require a biopsy. No specific treatment is required.
Cystic Masses

Two major categories of cystic masses exist and are related to either an infectious or a non-infectious cause.

Non-Infectious Cystic Masses

Bile Duct (Choledochal) Cysts may be present from birth (congenital) or may arise later in life. There appears to be a higher incidence of this process in females. Adult onset choledochal cysts are usually an incidental finding. If symptomatic, the patient may present with pain under the right rib cage, nausea, vomiting, fever and/or jaundice. In extreme cases, a patient may present with back pain. Patients may rarely present with inflammation of the liver and sometimes cirrhosis of the liver due to chronic obstruction of the bile duct. In addition to laboratory studies, a variety of imaging modalities may be needed. More invasive studies by a gastroenterologist or an interventional radiologist are required to fully delineate the extent of the disease process. Biopsy of the bile duct may be needed to rule out bile duct cancer. The presence of cancer may be known either before or at the time of the operation. The operation consists of resecting the diseased bile duct and reconnecting the remnant to the small intestine. A transplant evaluation is needed if liver cirrhosis is noted on the preoperative workup.
A simple liver cyst is usually a single cyst located within the liver, which is present from birth. Most cysts are asymptomatic and are uncommonly diagnosed before age 40. If symptomatic, patients complain of abdominal fullness and pain. Diagnosis is made radiographically. No specific treatment is needed in cases where the cyst is less than 8 cm in diameter or is within the confines of liver tissue. Infectious or cancerous causes as well as possible communication with the bile duct system must be ruled out prior to performing an operation. Laparoscopic marsupialization (widely opening the cyst to drain into the abdominal cavity) is the approach of choice. In certain cases, the location of the cyst may preclude marsupialization and may require a partial liver resection.

Polycystic Liver Disease (PCLD) is an inherited condition and may be associated with cystic lesions of the kidneys. Most patients are asymptomatic with normal laboratory studies. The liver cysts are multiple and tend to enlarge slowly. Symptoms are similar to that of simple cysts. Ultrasound and CT scans are reliable in detecting the lesions. These cysts must be differentiated from multiple simple cysts given that PCLD is an inherited disease. There are genetic tests available to help counsel afflicted patients and families. A liver, kidney or combined liver-kidney transplant may be necessary depending on disease severity of the organs afflicted.
Infectious Cystic Masses

Pyogenic Liver Abscesses (bacterial cause) - There are numerous causes of bacterial infections that bring about abscess formation in the liver. Presently, disease processes within the bile duct that cause bile flow obstruction are the most common cause of pyogenic abscesses. Other causes include intra-abdominal infections (i.e. appendicitis or diverticulitis), trauma to the liver, or ablative therapies (TACE, RFA) used to treat liver cancer. Finally, distant infectious processes such as dental abscesses and endocarditis may cause liver abscess formation. A specific source is not identified in up to 55% of cases. Patients can present with fevers, chills, nausea, vomiting, abdominal pain and loss of appetite. Some may present with a severe illness if rupture of the abscess into the abdominal cavity has occurred. The diagnosis can be made with a combination of history and physical examination, laboratory studies and radiologic examination.

Treatment depends on the clinical condition of the patient and radiologic findings. Typically, antibiotic therapy is initiated and the abscess is drained using a catheter placed directly into the abscess by the radiologist (90% successful). Surgical intervention is needed in more severe cases.

Amebic Liver Abscess - Amebic infection or amebiasis is a common infection in the tropics. In the United States individuals at risk for amebiasis are those who have immigrated from or traveled to endemic areas. The organism responsible for the disease process is Entamoeba Histolytica. Transmission usually occurs via ingestion of infected water. Liver abscess formation occurs when the ameba penetrates through the intestines and into local veins that drain into the liver. Liver abscesses are more common in patients who are immunocompromised, malnourished or have a malignancy. Less than one-third of the patients have intestinal symptoms prior to the diagnosis of liver abscess. Patients usually present with acute abdominal pain and fever. Up to 8% of patients present with mild jaundice. Tests to detect antibodies in the blood (positive in up to 95% of patients) are available and should be performed. Various radiologic studies can be used to help in the diagnosis. Treatment is primarily with antibiotics. Aspiration of the abscess is rarely indicated. An operation is indicated if worsening infection is noted despite adequate medical therapy.

Hydatid Cysts - These liver cysts are caused by a parasitic organism found in dogs. Echinococcus granulosus or Echinococcus multilocularis are parasites (tapeworms) that infect dogs. Tapeworm embryos are present in the feces of dogs. After inadvertent ingestion, the tapeworm embryo will penetrate the intestine and usually find its way to the liver. It may also migrate to other structures such as the lung, spleen, brain, bone or kidney after entering the bloodstream. Cysts are usually visible three weeks after ingestion and continue to secrete fluid causing compression of the liver. Cysts less than 5 cm are usually asymptomatic and no specific treatment is required.

Patients usually have symptoms of abdominal fullness. Pain usually is noted when cysts get infected or rupture. The most common site of rupture is into the bile ducts within the liver causing symptoms of bile duct obstruction and infection.

Some patients may present with an allergic reaction after cyst rupture. Radiologic studies used to diagnose hydatid cysts are ultrasound and CT scans. Antibody tests are available to detect hydatid cysts and should be completed. Treatment options range from chemotherapy (mebendazole and albendazole) to surgery. Surgery can entail a conservative approach (various drainage type procedures) or a radical operation that removes the entire cyst with a rim of normal liver.
Echinococcal (Hydatid) Cyst