Liver Cancer
(Hepatocellular Carcinoma)

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 California Pacific Medical Center, our Liver Cancer Program sees individuals with both hepatocellular carcinoma (primary liver cancer) and metastatic liver lesions. Our medical-surgical team, comprising an oncologist, hepatologist, radiologist, and surgeon, works together to evaluate each patient and determine optimal liver cancer treatment. Current treatment options include surgical removal of tumors, liver transplantation, application of chemotherapy and radiation into the liver, and systemic chemotherapy treatments.

Tumor Detection
Liver cancer may be hard to detect. Some patients do not feel any differently and the tumors are asymptomatic. For this reason, physicians advise screening high-risk patients periodically.

Surveillance tools for HCC include ultrasound and alphafetoprotein (AFP) blood test. AFP is a protein produced by the liver, and 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 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. 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 elevated AFP levels or 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 diagnosis and localization of the lesion, staging, and a determination of treatment options. California Pacific Medical Center 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.
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**The liver’s eight-segment division.**

**Diagnostic Imaging**

At California Pacific, 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, or 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 nuclear medicine bone scan. After treatment, or while awaiting liver transplant, patients should continue to be staged every three to six months with chest and abdomen CT and bone scans. If, following this staging, there is a question of extrahepatic disease, physicians may offer patients a diagnostic laparoscopy or endoscopic ultrasound (EUS).

**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.

**Surgical Resection (Tumor Removal)**

If patients can withstand surgery and have sufficient liver function, resection offers an excellent five-year survival rate of more than 50%. Liver cancer can recur after resection, and close surveillance is required.

Surgical resection involves the removal of one or more sections of the liver in which a tumor(s) exists. Typically, surgeons can remove up to 70% of a cancerous liver (if there is no or mild fibrosis) and it will regenerate in about two to six weeks following surgery. Unfortunately, less than 10% of patients are candidates for liver resection.

For surgical purposes, the liver is divided into eight segments (see illustration), based on vascular inflow and bile duct drainage. Branches of the hepatic artery and portal vein supply each segment.

During resection, the surgeon first uses ultrasound to determine the tumor’s proximity to hepatic structures. The surgeon’s goal is to remove the tumor(s) and as little liver as possible, while ensuring a margin free of tumor. Using vascular occlusion and isolation techniques that cut off blood flow to the liver during surgery, it is now possible to perform major hepatic resections with minimal blood loss. As with all resections, postoperative complications can occur from the cut edge of the liver. These include bleeding and bile leaks. Most of these complications can be treated nonoperatively.

**Liver Transplantation**

While a liver transplant represents an excellent cure for most patients with HCC, the limited organ supply makes this option unattainable for some. Patients who may...
benefit from liver transplantation include those with small, unresectable HCC and cirrhosis. The United Network for Organ Sharing (UNOS) eligibility criteria for transplantation are the presence of a single hepatoma 5 cm or less in diameter, or three or fewer tumor nodules, each 3 cm or less in diameter. These criteria can elevate a patient’s status on the transplant list.

While waiting for transplantation due to HCC, patients should be monitored with serial abdominal imaging to evaluate for tumor growth. Often, local treatment needs to be done while awaiting transplant to control tumor growth. The five-year survival with transplant is more than 70% with a risk of tumor recurrence of less than 10%.

Ablation

Patients who are not candidates for transplant or resection due to inadequate liver reserve, large or multiple lesions in multiple lobes, or cirrhosis 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 113° F and thereby destroying the lesion. This technique can be used via computed tomography (CT) by an interventional radiologist, or using laparoscopic or open surgery techniques with ultrasound guidance by a surgeon, depending on the lesion’s size and location.

Transarterial Therapy

Patients with HCC and cirrhosis are frequently treated with transarterial therapy, a technique that delivers treatments directly into the liver. To gain access to the liver, physicians first make a small incision in the patient’s leg and then place a long catheter into the femoral artery. Guided by fluoroscopy (an X-ray imaging technique), the physician then moves the catheter up through the blood vessels to the hepatic artery, one of two blood vessels that feed the liver. These procedures are usually performed in a hospital’s radiology suite, and patients remain conscious but sedated throughout the procedures.

Types of transarterial therapy include:

- **Transarterial Chemoembolization (TACE) with Lipiodol**—Transarterial chemoembolization (TACE) involves delivery of chemotherapy directly to the liver, followed by a process to “lock in” (embolize) the chemotherapy. In this therapy, Lipiodol—a thick, oily substance—is mixed with chemotherapy (platinol, mitomycin-c, and adriamycin) and injected under radiological guidance directly into the artery supplying the tumor. The Lipiodol acts to contain the chemotherapy within the tumor and blocks further blood flow to the tumor. Blocking the flow of blood to the cancer helps to kill the cancer cells, as it cuts off the tumor’s food and oxygen supply.

- **Transarterial Chemoembolization (TACE) with Doxorubicin-filled Beads**—Doxorubicin is a chemotherapeutic agent that helps stop the growth of tumor cells. In this therapy, doxorubicin-filled beads are delivered directly to the liver, which releases chemotherapy slowly over time and also blocks the blood flow to the tumor. With doxorubicin-filled beads, the delivery of chemotherapy-filled beads prolongs the dwell time of the chemotherapeutic agent and enhances drug delivery to liver tumors 10- to 100-fold compared to systemic infusion.
Microspheres injected during transarterial therapy "lock in" chemotherapy.

Radioactive Yttrium Beads—This therapy uses radioactive yttrium beads delivered via a catheter into the hepatic artery. The beads precisely deliver radiation to the tumor, which kills the tumor cells. The beads are quite small and do not occlude the blood flow, which allows access to the tumor again if further treatment is needed. This therapy can be used in larger tumors than the above therapies, and may also be used if the portal vein is occluded since the arterial flow to the liver is not occluded.

In general, response rates to chemotherapy and radiation for HCC are 60%–80% with an average duration of one year. The above therapies can be repeated multiple times based on response to therapy.

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. Sorafenib, an oral multikinase inhibitor, has been shown to prolong survival in patients with metastatic or advanced disease. Combinations of this drug with other experimental agents or with chemotherapy are under clinical investigation.

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.

Why Choose Us

California Pacific Medical Center’s San Francisco Center for Liver Disease Program offers comprehensive specialty care for adult end-stage liver disease and liver cancer. We emphasize ongoing communication with referring physicians and incorporate them into the decision process of their patients’ medical management. Following treatment, we follow up our care with an organized discharge report to the referring physician.

For patients requiring hospitalization, we have a dedicated critical care liver unit, a hospitalist who specializes in liver disease, physician assistants, on-call anesthesia staff, and a specialized O.R. nursing team. At California Pacific, our focus is on providing experienced, personalized care for all patients.

Our Cancer Care Navigation Service provides individuals and families assistance with appointment scheduling, patient education, and support service referral. Call 1–866–975–COPE (2673) or email patientnavigation@sutterhealth.org.

Patient education and support is a priority at our center, and patients and their families have access to a weekly patient education class and monthly support group.

With the use of new treatment methods and ongoing clinical research, patients now have more options than ever for treating liver cancer. For patients who may not be eligible for the therapies outlined above, California Pacific has an active Hepatology and Gastroenterology Research Program that is involved in new, investigational techniques. We welcome patients who are interested in pursuing clinical trials for these new therapies.

For more information

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