



California Pacific
Medical Center

A Sutter Health Affiliate
With You. For Life.

Liver Cancer (Hepatocellular Carcinoma)

LIVER DISEASE MANAGEMENT & TRANSPLANT PROGRAM

At California Pacific Medical Center we are committed to bringing new and advanced diagnostic tools, medical treatments and surgical options to the physicians and patients we serve. Through this procedure profile, our physicians illustrate current and emergent treatment options we can provide for the specialized medical management of your patients.

Our promise to our patients is to deliver the highest quality expert care with kindness and compassion. We go beyond medicine to treat the whole person, not just the illness. Because medicine can transform a body. But going beyond medicine can transform a life.

For patient referrals:

1-888-637-2762

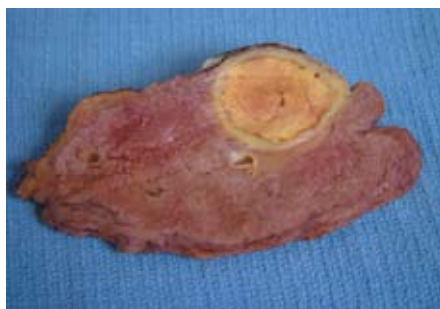
www.cpmc.org/liver

Beyond Medicine.

Overview

Numerous surgical advances and the involvement of surgeons early in the evaluation of liver lesions have resulted in the ability to resect more liver malignancies with lower rates of operative mortality. At California Pacific, a medical-surgical team including an oncologist, hepatologist, radiologist and surgeon work together with hepatocellular carcinoma (HCC) patients, evaluating a patient's ability to tolerate a liver transplant, a resection or other treatment regimens.

Because time is critical after the diagnosis of HCC, patients who are not candidates for resection should be referred immediately for possible ablative therapy, chemotherapy and/or liver transplantation if indicated.



A liver tumor (light portion).

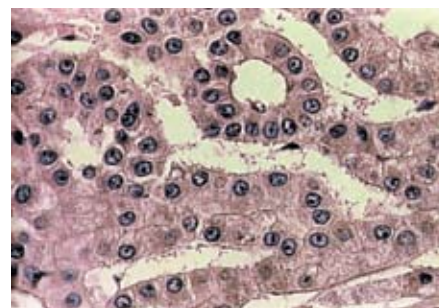
Tumor Detection

Initially, liver cancer is hard to detect. Patients typically don't feel any differently as most tumors are asymptomatic. For this reason, physicians advise screening high-risk patients (those with infectious hepatitis or a family history of HCC) periodically.

Surveillance tools for HCC include an alphafetoprotein (AFP) blood test and ultrasound examination. AFP is a protein

produced by the liver and an elevated level can indicate tumor growth. For patients at risk for liver cancer, California Pacific recommends an AFP blood test and liver ultrasound every six months.

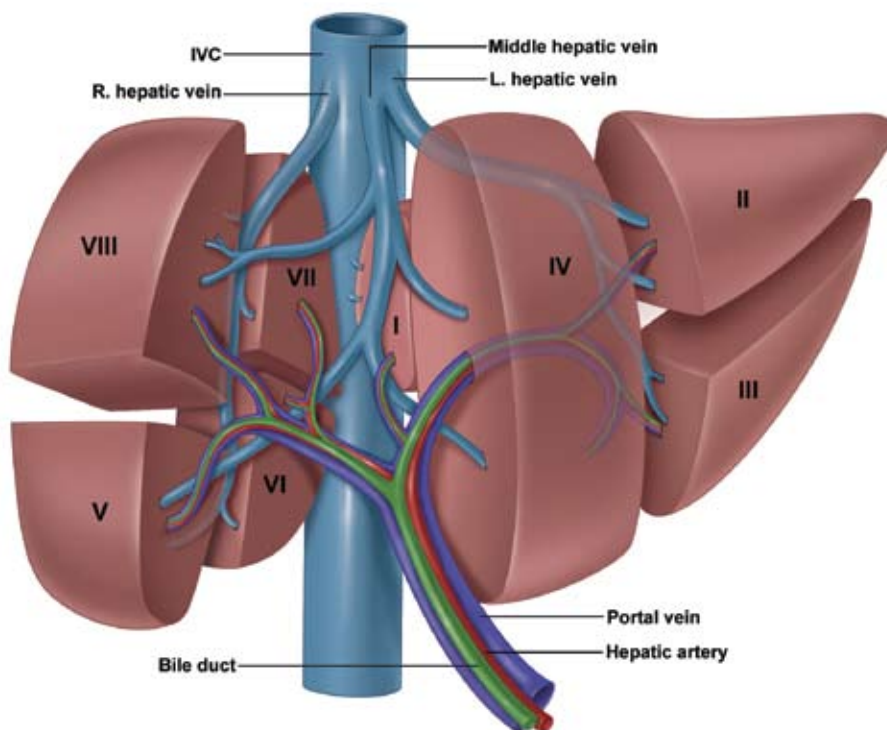
If patients develop symptoms, the first is usually pain that extends from the abdomen to the back and shoulder. Weight loss is common and sometimes patients have episodes of severe pain, fever and nausea. Rapidly deteriorating health, weakness, tenderness and jaundice may also imply HCC.



Slide of cancerous liver cells.

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 a combined medical, oncologic and surgical consultation. This pre-operative evaluation includes diagnosis and localization of the lesion, staging and a determination of resectability. California Pacific Medical Center uses a variety of techniques to help deter-



The liver's eight-segment division.

mine the location and stage of HCC. Diagnostic imaging procedures, along with the AFP blood test are the most accurate methods. While attempts at obtaining a histologic diagnosis are tempting, there is a relative contraindication to a tissue biopsy because of the risk of spreading cancer cells. Instead, the following imaging procedures are employed:

Diagnostic Imaging

At California Pacific, liver imaging begins with four-phase computed tomography (CT), including spiral CT scans obtained during hepatic arterial and portal venous phases following intravenous contrast administration. This technique can accurately demonstrate the number of primary tumors within the liver and their relationship to vascular structures. In some patients, state-of-the-art magnetic resonance imaging (MRI) and Doppler ultrasound are used as complementary imaging techniques. FDG positron emission tomography (PET) is occasionally helpful in characterizing

atypical hepatic masses as well as in detecting extrahepatic malignancy.

In some patients, diagnostic angiography may assist in characterizing indeterminate hepatic masses. During angiography, injection of lipiodol, an inert substance that accumulates in vascular tumors devoid of Kupffer cells, may allow detection of occult HCC on subsequent CT scans.

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 and pelvis CT scan and nuclear medicine bone scan. Patients who do not undergo resection or ablation, or those waiting for a transplant, should continue to be staged every two to six months with chest, abdomen, pelvis 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). Patients may also require head imaging if headache or neurologic symptoms are present.

Surgical Interventions for Liver Cancer

When determining treatment options for hepatocellular carcinoma (HCC), our team evaluates the lesion imaging and lab results, along with patients' age 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.

Surgical Resection (Tumor Removal)

If patients can withstand surgery and have enough liver reserve, a resection is the best option since this intervention also offers the chance to cure liver cancer. 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.

Prior to surgery, some resection patients with moderate to severe fibrosis undergo pre-op portal vein embolization, a procedure in which tiny microspheres are inserted into the portal vein, blocking blood flow to the portion of the liver containing tumor(s). This technique results in the enlargement of the remaining liver segments on which the patient will depend after resection. Portal vein embolization is recommended

for patients who may not have enough liver reserve for sufficient re-growth following resection. 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, post-operative 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 is 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. This criteria can elevate a patient's status on the transplant list. While waiting for transplantation due to HCC, patients should be staged with chest, abdomen and pelvis CT and bone scans every two to six months. Sometimes local treatment needs to be done while waiting to control the tumor. The four-year overall transplant survival rate for patients with HCC is 85% and the recurrence-free survival rate is 92%.

Radiofrequency Ablation

Patients who are not candidates for transplant or resection due to inadequate liver reserve, large or multiple lesions in multiple lobes, fibrosis or cirrhosis can benefit from minimally invasive ablation therapy. This therapy uses extreme heat to destroy liver tumors. It is ideal for:

- benign tumors of the liver;
- malignant tumors that are not resectable;
- malignant tumors in patients who are too ill to undergo resection.

With radiofrequency ablation (RFA) technology, liver tumors up to 7 cm in diameter can be treated. The ideal patient for RFA generally has no more than three lesions that are no greater than 5 cm in size. RFA 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.

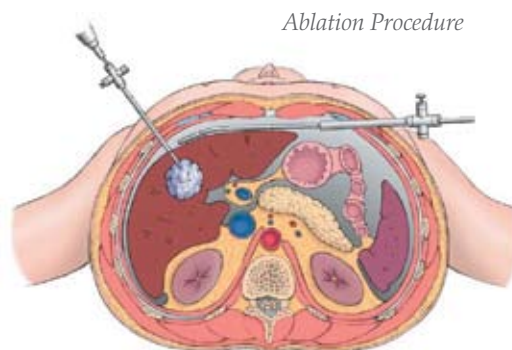
Transarterial Therapy

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 cath-

eter 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 CHEMO-EMBOLIZATION (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 CHEMO-EMBOLIZATION (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.



Systemic Chemotherapy

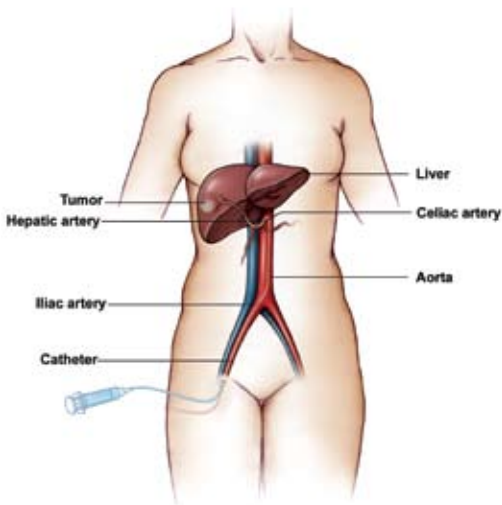
Systemic chemotherapy uses a mixture of anti-cancer drugs injected into a vein or taken by mouth. Typically, this alternative is reserved for patients with metastatic disease or those who are not candidates for other procedures. Depending on any underlying disease, different drugs are applied. Sorafenib, 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's Liver Disease Management and Transplant Program offers comprehensive specialty care for adult end-stage liver disease. We emphasize ongoing communication with referring physicians and incorporate them into the decision process of their patient's 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.

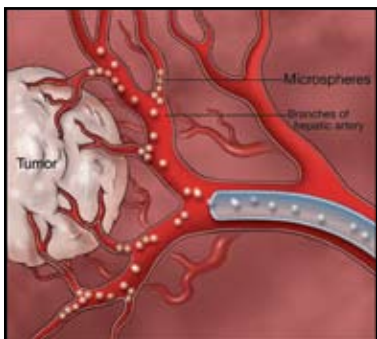
Our Cancer Care Navigation Service provides individuals and families assistance with appointment scheduling, patient education and support service referral. Call 1-866-975-COPE (2673) or email patientnavigation@sutterhealth.org.



Transarterial Therapy

■ **RADIOACTIVE YTTRIUM BEADS**— This therapy uses TheraSphere® 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 is able to 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 before transplantation with excellent disease-free survival.



Microspheres injected during transarterial therapy "lock in" chemotherapy.

With the use of new surgical 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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