
What

You

Need

To

Know

About™

Liver Cancer

This booklet is about liver cancer. The Cancer Information Service can help you learn more about this disease. The staff can talk with you in English or Spanish.

The number is 1-800-4-CANCER (1-800-422-6237). The number for deaf and hard of hearing callers with TTY equipment is 1-800-332-8615. The call is free.

Este folleto es acerca del cáncer del hígado. Llame al Servicio de Información sobre el Cáncer para saber más sobre esta enfermedad. Este servicio tiene personal que habla español.

El número a llamar es el 1-800-4-CANCER (1-800-422-6237). Personas con problemas de audición y que cuentan con equipo TTY pueden llamar al 1-800-332-8615. La llamada es gratis.

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What You Need To Know About™ Liver Cancer

This National Cancer Institute (NCI) booklet has important information about *cancer** that begins in the liver. It discusses possible causes, symptoms, diagnosis, and treatment of liver cancer. It also has information to help patients cope with this disease.

Information specialists at the NCI's Cancer Information Service at 1-800-4-CANCER can help people with questions about cancer and can send NCI publications. Also, many NCI publications are on the Internet at <http://cancer.gov/publications>. People in the United States and its territories may use this Web site to order publications. This Web site also explains how people outside the United States can mail or fax their requests for NCI publications.

Primary and Secondary Cancers

Cancer that begins in the liver is called *primary* liver cancer. In the United States, this type of cancer is uncommon. However, it is common for cancer to spread to the liver from the colon, lungs, breasts, or other parts of the body. When this happens, the disease is not liver cancer. The cancer in the liver is a *secondary* cancer. It is named for the organ or the tissue in which it began.

This booklet is only about cancer that begins in the liver. It is not about cancer that spreads to the liver from other parts of the body.

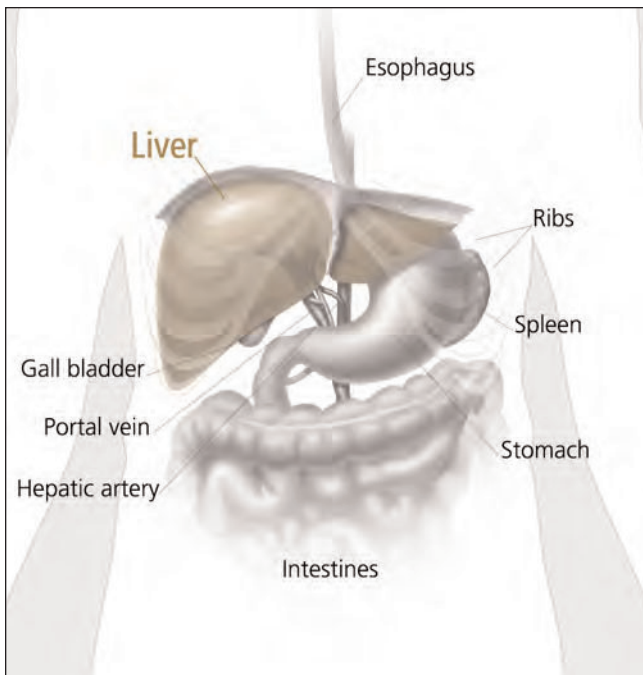
*Words that may be new to readers are in *italics*. The “Dictionary” section gives definitions of these terms. Some words in the “Dictionary” have a “sounds-like” spelling to show how to pronounce them.

The Liver

The *liver* is the largest organ in the body. It is found behind the ribs on the right side of the *abdomen*. The liver has two parts, a right *lobe* and a smaller left lobe.

The liver has many important functions that keep a person healthy. It removes harmful material from the blood. It makes *enzymes* and *bile* that help digest food. It also converts food into substances needed for life and growth.

The liver gets its supply of blood from two vessels. Most of its blood comes from the *hepatic portal vein*. The rest comes from the *hepatic artery*.



This picture shows the liver and nearby organs.

Understanding Cancer

Cancer is a group of many related diseases. All cancers begin in *cells*, the body's basic unit of life. Cells make up *tissues*, and tissues make up the organs of the body.

Normally, cells grow and divide to form new cells as the body needs them. When cells grow old and die, new cells take their place.

Sometimes, this orderly process goes wrong. New cells form when the body does not need them, or old cells do not die when they should. These extra cells can form a mass of tissue called a growth or *tumor*. Tumors can be *benign* or *malignant*:

- **Benign tumors** are not cancer. Usually, doctors can remove them. In most cases, benign tumors do not come back after they are removed. Cells from benign tumors do not spread to tissues around them or to other parts of the body. Most important, benign tumors are rarely a threat to life.
- **Malignant tumors** are cancer. They are generally more serious and may be life threatening. Cancer cells can invade and damage nearby tissues and organs. Also, cancer cells can break away from a malignant tumor and enter the bloodstream or the *lymphatic system*. That is how cancer cells spread from the original cancer (the *primary tumor*) to form new tumors (*secondary tumors*) in other organs. The spread of cancer is called *metastasis*. Different types of cancer tend to spread to different parts of the body.

Most primary liver cancers begin in *hepatocytes* (liver cells). This type of cancer is called *hepatocellular carcinoma* or malignant *hepatoma*.

Children may develop childhood hepatocellular carcinoma or *hepatoblastoma*. This booklet does not deal with childhood liver cancer. Printed material is available at <http://cancer.gov>. Also, the Cancer Information Service (1-800-4-CANCER) can provide information about liver cancer in children.

When liver cancer spreads (*metastasizes*) outside the liver, the cancer cells tend to spread to nearby lymph nodes and to the bones and lungs. When this happens, the new tumor has the same kind of abnormal cells as the primary tumor in the liver. For example, if liver cancer spreads to the bones, the cancer cells in the bones are actually liver cancer cells. The disease is metastatic liver cancer, not bone cancer. It is treated as liver cancer, not bone cancer. Doctors sometimes call the new tumor “distant” disease.

Similarly, cancer that spreads to the liver from another part of the body is different from primary liver cancer. The cancer cells in the liver are like the cells in the original tumor. When cancer cells spread to the liver from another organ (such as the colon, lung, or breast), doctors may call the tumor in the liver a secondary tumor. In the United States, secondary tumors in the liver are far more common than primary tumors.

Liver Cancer: Who's at Risk?

Researchers in hospitals and medical centers around the world are working to learn more about what causes liver cancer. At this time, no one knows its exact causes. However, scientists have found that people with certain *risk factors* are more likely than others to develop liver cancer. A risk factor is anything that increases a person's chance of developing a disease.

Studies have shown the following risk factors:

- **Chronic liver infection (*hepatitis*)**—Certain *viruses* can infect the liver. The infection may be chronic. (It may not go away.) The most important risk factor for liver cancer is a chronic infection with the *hepatitis B virus* or the *hepatitis C virus*. These viruses can be passed from person to person through blood (such as by sharing needles) or sexual contact. An infant may catch these viruses from an infected mother. Liver cancer can develop after many years of infection with the virus.

These infections may not cause *symptoms*, but blood tests can show whether either virus is present. If so, the doctor may suggest treatment. Also, the doctor may discuss ways of avoiding infecting other people.

In people who are not already infected with hepatitis B virus, hepatitis B *vaccine* can prevent chronic hepatitis B infection and can protect against liver cancer. Researchers are now working to develop a vaccine to prevent hepatitis C infection.

- **Cirrhosis**—Cirrhosis is a disease that develops when liver cells are damaged and replaced with scar tissue. Cirrhosis may be caused by alcohol abuse, certain drugs and other chemicals, and certain viruses or *parasites*. About 5 percent of people with cirrhosis develop liver cancer.
- **Aflatoxin**—Liver cancer can be caused by aflatoxin, a harmful substance made by certain types of *mold*. Aflatoxin can form on peanuts, corn, and other nuts and grains. In Asia and Africa, aflatoxin contamination is a problem. However, the U.S. Food and Drug Administration (FDA) does not allow the sale of foods that have high levels of aflatoxin.

- **Being male**—Men are twice as likely as women to get liver cancer.
- **Family history**—People who have family members with liver cancer may be more likely to get the disease.
- **Age**—In the United States, liver cancer occurs more often in people over age 60 than in younger people.

The more risk factors a person has, the greater the chance that liver cancer will develop. However, many people with known risk factors for liver cancer do not develop the disease.

People who think they may be at risk for liver cancer should discuss this concern with their doctor. The doctor may plan a schedule for checkups.

Symptoms

Liver cancer is sometimes called a “silent disease” because in an early *stage* it often does not cause symptoms. But, as the cancer grows, symptoms may include:

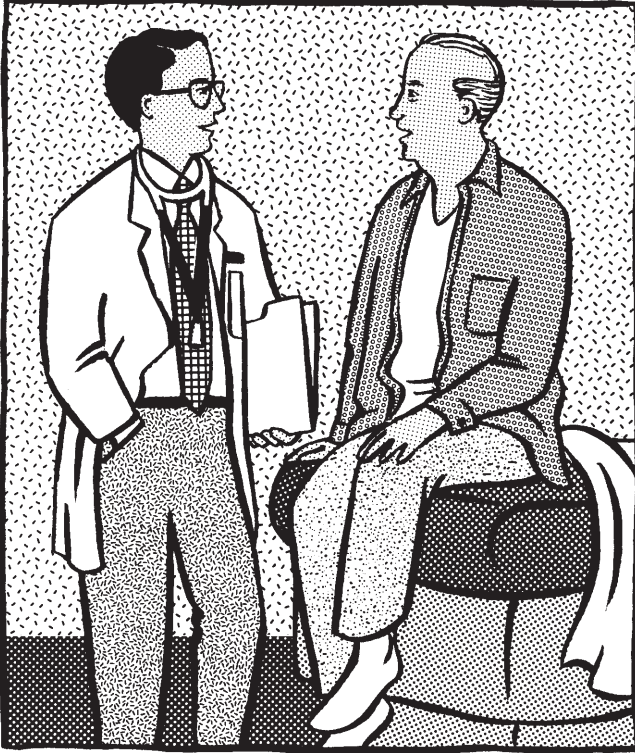
- Pain in the upper abdomen on the right side; the pain may extend to the back and shoulder
- Swollen abdomen (bloating)
- Weight loss
- Loss of appetite and feelings of fullness
- Weakness or feeling very tired
- Nausea and vomiting
- Yellow skin and eyes, and dark urine from *jaundice*
- Fever

These symptoms are not sure signs of liver cancer. Other liver diseases and other health problems can also cause these symptoms. Anyone with these symptoms should see a doctor as soon as possible. Only a doctor can diagnose and treat the problem.

Diagnosis

If a patient has symptoms that suggest liver cancer, the doctor performs one or more of the following procedures:

- **Physical exam**—The doctor feels the abdomen to check the liver, *spleen*, and nearby organs for any lumps or changes in their shape or size. The doctor also checks for *ascites*, an abnormal buildup of fluid in the abdomen. The doctor may examine the skin and eyes for signs of jaundice.
- **Blood tests**—Many blood tests may be used to check for liver problems. One blood test detects *alpha-fetoprotein* (AFP). High AFP levels could be a sign of liver cancer. Other blood tests can show how well the liver is working.
- **CT scan**—An *x-ray* machine linked to a computer takes a series of detailed pictures of the liver and other organs and blood vessels in the abdomen. The patient may receive an injection of a special dye so the liver shows up clearly in the pictures. From the CT scan, the doctor may see tumors in the liver or elsewhere in the abdomen.
- **Ultrasound test**—The ultrasound device uses sound waves that cannot be heard by humans. The sound waves produce a pattern of echoes as they bounce off internal organs. The echoes create a picture (*sonogram*) of the liver and other organs in the abdomen. Tumors may produce echoes that are different from the echoes made by healthy tissues.



- **MRI**—A powerful magnet linked to a computer is used to make detailed pictures of areas inside the body. These pictures are viewed on a monitor and can also be printed.
- **Angiogram**—For an angiogram, the patient may be in the hospital and may have *anesthesia*. The doctor injects dye into an artery so that the blood vessels in the liver show up on an x-ray. The angiogram can reveal a tumor in the liver.
- **Biopsy**—In some cases, the doctor may remove a sample of tissue. A *pathologist* uses a microscope to look for cancer cells in the tissue. The doctor may obtain tissue in several ways. One way is by inserting a thin needle into the liver to remove a

small amount of tissue. This is called *fine-needle aspiration*. The doctor may use CT or ultrasound to guide the needle. Sometimes the doctor obtains a sample of tissue with a thick needle (*core biopsy*) or by inserting a thin, lighted tube (*laparoscope*) into a small *incision* in the abdomen. Another way is to remove tissue during an operation.

A patient who needs to have a biopsy may want to ask the doctor some of the following questions:

- Why do I need a biopsy? How will the biopsy affect my treatment plan?
- What kind of biopsy will I have?
- How long will it take? Will I be awake? Will it hurt?
- Is there a risk that the biopsy procedure will cause the cancer to spread? What are the chances of infection or bleeding after the biopsy? Are there any other risks?
- How soon will I know the results?
- If I do have cancer, who will talk with me about treatment? When?

Staging

If liver cancer is diagnosed, the doctor needs to know the stage, or extent, of the disease to plan the best treatment. *Staging* is an attempt to find out the size of the tumor, whether the disease has spread, and if so, to what parts of the body. Careful staging shows whether the tumor can be removed with *surgery*. This

is very important because most liver cancers cannot be removed with surgery.

The doctor may determine the stage of liver cancer at the time of diagnosis, or the patient may need more tests. These tests may include *imaging* tests, such as a CT scan, MRI, angiogram, or ultrasound. Imaging tests can help the doctor find out whether the liver cancer has spread. The doctor also may use a laparoscope to look directly at the liver and nearby organs.

Treatment

Many people with liver cancer want to take an active part in decisions about their medical care. They want to learn all they can about their disease and their treatment choices. However, the shock and stress that people often feel after a diagnosis of cancer can make it hard for them to think of everything they want to ask the doctor. Often it helps to make a list of questions before an appointment. To help remember what the doctor says, patients may want to take notes or ask whether they may use a tape recorder. Some patients also want to have a family member or friend with them when they talk to the doctor—to take part in the discussion, to take notes, or just to listen.

At this time, liver cancer can be cured only when it is found at an early stage (before it has spread) and only if the patient is healthy enough to have an operation. However, treatments other than surgery may be able to control the disease and help patients live longer and feel better. When a cure or control of the disease is not possible, some patients and their doctors choose *palliative therapy*. Palliative therapy aims to improve the quality of a person's life by controlling pain and other problems caused by the disease.

The doctor may refer patients to doctors who specialize in treating cancer, or patients may ask for a referral. Specialists who treat liver cancer include *surgeons, transplant surgeons, gastroenterologists, medical oncologists, and radiation oncologists.*

Getting a Second Opinion

Before starting treatment, a patient may want to get a second opinion about the diagnosis, the stage of cancer, and the treatment plan. Some insurance companies require a second opinion; others may cover a second opinion if the patient requests it.

There are a number of ways to find a doctor for a second opinion:

- The doctor may refer patients to one or more specialists. At cancer centers, several specialists often work together as a team.
- The Cancer Information Service (1-800-4-CANCER) can tell callers about treatment facilities, including cancer centers and other programs supported by the National Cancer Institute, and can send printed information about finding a doctor.
- A local medical society, a nearby hospital, or a medical school can usually provide the names of specialists.
- The *Official ABMS Directory of Board Certified Medical Specialists* lists doctors' names along with their specialty and their educational background. This resource is available in most public libraries. The American Board of Medical Specialties (ABMS) also offers information by telephone and on the Internet. The public may use these services to check whether a doctor is board certified. The telephone number is 1-866-ASK-ABMS (1-866-275-2267). The Internet address is <http://www.abms.org/newsearch.asp>.

Treatment Choices

The doctor can describe treatment choices and discuss the results expected with each treatment option. The doctor and patient can work together to develop a treatment plan that fits the patient's needs.

Cancer of the liver is very hard to control with current treatments. For that reason, many doctors encourage patients with liver cancer to consider taking part in a *clinical trial*. Clinical trials are research studies testing new treatments. They are an important option for people with all stages of liver cancer. The section called “The Promise of Cancer Research” has more information about clinical trials.

The choice of treatment depends on the condition of the liver; the number, size, and location of tumors; and whether the cancer has spread outside the liver. Other factors to consider include the patient's age, general health, concerns about the treatments and their possible *side effects*, and personal values.

Usually, the most important factor is the stage of the disease. The stage is based on the size of the tumor, the condition of the liver, and whether the cancer has spread. The following are brief descriptions of the stages of liver cancer and the treatments most often used for each stage. For some patients, other treatments may be appropriate.

Localized resectable cancer

Localized *resectable* liver cancer is cancer that can be removed during surgery. There is no evidence that the cancer has spread to the nearby lymph nodes or to other parts of the body. Lab tests show that the liver is working well.

Surgery to remove part of the liver is called partial *hepatectomy*. The extent of the surgery depends on the size, number, and location of the tumors. It also

depends on how well the liver is working. The doctor may remove a wedge of tissue that contains the liver tumor, an entire lobe, or an even larger portion of the liver.

In a partial hepatectomy, the surgeon leaves a margin of normal liver tissue. This remaining healthy tissue takes over the functions of the liver.

For a few patients, liver *transplantation* may be an option. For this procedure, the transplant surgeon removes the patient's entire liver (total hepatectomy) and replaces it with a healthy liver from a donor. A liver transplant is an option only if the disease has not spread outside the liver and only if a suitable donated liver can be found. While the patient waits for a donated liver to become available, the health care team monitors the patient's health and provides other treatments, as necessary.

Localized unresectable cancer

Localized *unresectable* liver cancer cannot be removed by surgery even though it has not spread to the nearby lymph nodes or to distant parts of the body. Surgery to remove the tumor is not possible because of cirrhosis or other conditions that cause poor liver function, the location of the tumor within the liver, or other health problems.

Patients with localized unresectable cancer may receive other treatments to control the disease and extend life:

- **Radiofrequency ablation**—The doctor uses a special probe to kill the cancer cells with heat. The probe contains tiny electrodes that destroy the cancer cells. Sometimes the doctor can insert the probe directly through the skin. Only *local anesthesia* is needed. In other cases, the doctor may insert the probe through a small incision in the abdomen or may make a

wider incision to open the abdomen. These procedures are done in the hospital with *general anesthesia*.

Other therapies that use heat to destroy liver tumors include *laser* or *microwave therapy*.

- ***Percutaneous ethanol injection***—The doctor injects alcohol (ethanol) directly into the liver tumor to kill cancer cells. The doctor uses ultrasound to guide a small needle. The procedure may be performed once or twice a week. Usually local anesthesia is used, but if the patient has many tumors in the liver, general anesthesia may be needed.
- ***Cryosurgery***—The doctor makes an incision into the abdomen and inserts a metal probe to freeze and kill cancer cells. The doctor may use ultrasound to help guide the probe.
- ***Hepatic arterial infusion***—The doctor inserts a tube (*catheter*) into the hepatic artery, the major artery that supplies blood to the liver. The doctor then injects an anticancer drug into the catheter. The drug flows into the blood vessels that go to the tumor. Because only a small amount of the drug reaches other parts of the body, the drug mainly affects the cells in the liver.

Hepatic arterial infusion also can be done with a small pump. The doctor implants the pump into the body during surgery. The pump continuously sends the drug to the liver.

- ***Chemoembolization***—The doctor inserts a tiny catheter into an artery in the leg. Using x-rays as a guide, the doctor moves the catheter into the hepatic artery. The doctor injects an anticancer drug into the artery and then uses tiny particles to block the flow of blood through the artery. Without blood flow, the drug stays in the liver longer. Depending on the type of particles used, the blockage may be temporary or

permanent. Although the hepatic artery is blocked, healthy liver tissue continues to receive blood from the hepatic portal vein, which carries blood from the stomach and *intestine*. Chemoembolization requires a hospital stay.

- **Total hepatectomy with liver transplantation**—If localized liver cancer is unresectable because of poor liver function, some patients may be able to have a liver transplant. While the patient waits for a donated liver to become available, the health care team monitors the patient’s health and provides other treatments, as necessary.

Advanced cancer

Advanced cancer is cancer that is found in both lobes of the liver or that has spread to other parts of the body. Although advanced liver cancer cannot be cured, some patients receive anticancer therapy to try to slow the progress of the disease. Others discuss the possible benefits and side effects and decide they do not want to have anticancer therapy. In either case, patients receive palliative care to reduce their pain and control other symptoms.

Treatment for advanced liver cancer may involve *chemotherapy*, *radiation therapy*, or both:

- **Chemotherapy** uses drugs to kill cancer cells. The patient may receive one drug or a combination of drugs. The doctor may use chemoembolization or hepatic arterial infusion. Or the doctor may give *systemic therapy*, meaning that the drugs are injected into a vein and flow through the bloodstream to nearly every part of the body. The doctor may call this *intravenous* or IV chemotherapy.

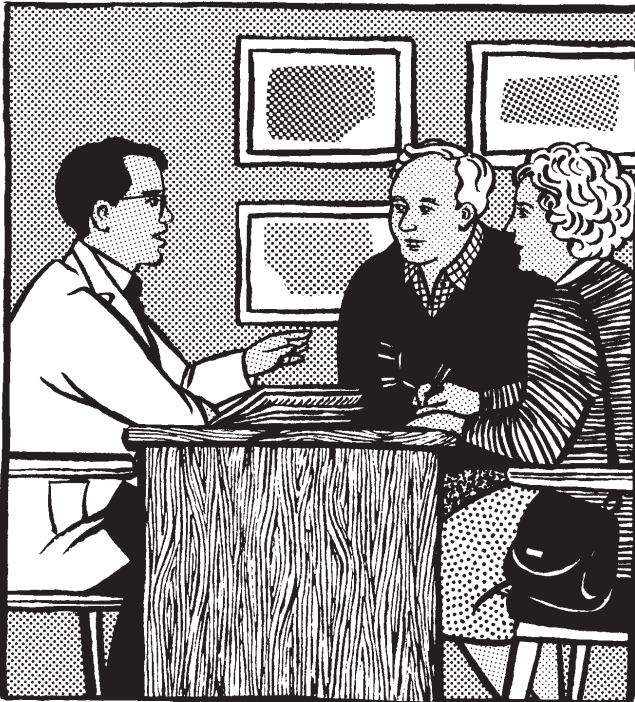
Usually chemotherapy is an *outpatient* treatment given at the hospital, clinic, or at the doctor’s office. However, depending on which drugs are given and

the patient's general health, the patient may need to stay in the hospital.

- **Radiation therapy** (also called radiotherapy) uses high-energy rays to kill cancer cells. Radiation therapy is *local therapy*, meaning that it affects cancer cells only in the treated area. A large machine outside the body directs radiation to the tumor area.

Recurrent cancer

Recurrent cancer means the disease has come back after the initial treatment. Even when a tumor in the liver seems to have been completely removed or destroyed, the disease sometimes returns because undetected cancer cells remained somewhere in the body after treatment. Most recurrences occur within the



first 2 years of treatment. The patient may have surgery or a combination of treatments for recurrent liver cancer.

People do not need to ask all of their questions or

These are some questions a person may want to ask the doctor before treatment begins:

- Is there any evidence the cancer has spread?
What is the stage of the disease?
- Do I need any more tests to determine whether I can have surgery?
- What are my treatment choices? Which do you recommend for me? Why?
- What are the expected benefits of each kind of treatment?
- What are the risks and possible side effects of each treatment?
- Will I need to stay in the hospital?
- How will you treat my pain?
- What is the treatment likely to cost? Is this treatment covered by my insurance plan?
- How will treatment affect my normal activities?
- Would a clinical trial (research study) be appropriate for me?

understand all of the answers at once. They will have other chances to ask the health care team to explain things that are not clear and to ask for more information.

Side Effects of Treatment

Because cancer treatment may damage healthy cells and tissues, unwanted side effects often occur. Side effects depend on many factors, including the type and extent of the treatment. Side effects may not be the same for each person, and they may even change from one treatment session to the next. The health care team will explain the possible side effects of treatment and how they will help the patient manage them.

The NCI provides helpful booklets about cancer treatments and coping with side effects, such as *Chemotherapy and You*, *Radiation Therapy and You*, and *Eating Hints for Cancer Patients*. See the “National Cancer Institute Information Resources” and “National Cancer Institute Booklets” sections for other sources of information about side effects.

Surgery

It takes time to heal after surgery, and the time needed to recover is different for each person. Patients are often uncomfortable during the first few days. However, medicine can usually control their pain. Patients should feel free to discuss pain relief with the doctor or nurse. It is common to feel tired or weak for a while. Also, patients may have diarrhea and a feeling of fullness in the abdomen. The health care team watches the patient for signs of bleeding, infection, liver failure, or other problems requiring immediate treatment.

After a liver transplant, the patient may need to stay in the hospital for several weeks. During that time, the health care team checks for signs of how well the patient’s body is accepting the new liver. The patient

takes drugs to prevent the body from rejecting the new liver. These drugs may cause puffiness in the face, high blood pressure, or an increase in body hair.

Cryosurgery

Because a smaller incision is needed for cryosurgery than for traditional surgery, recovery after cryosurgery is generally faster and less painful. Also, infection and bleeding are not as likely.

Percutaneous Ethanol Injection

Patients may have fever and pain after percutaneous ethanol injection. The doctor can suggest medicines to relieve these problems.

Chemoembolization and Hepatic Arterial Infusion

Chemoembolization and hepatic arterial infusion cause fewer side effects than systemic chemotherapy because the drugs do not flow through the entire body. Chemoembolization sometimes causes nausea, vomiting, fever, and abdominal pain. The doctor can give medications to help lessen these problems. Some patients may feel very tired for several weeks after the treatment.

Side effects from hepatic arterial infusion include infection and problems with the pump device. Sometimes the device may have to be removed.

Systemic Chemotherapy

The side effects of chemotherapy depend mainly on the drugs and the doses the patient receives. As with other types of treatment, side effects are different for each patient.

Systemic chemotherapy affects rapidly dividing cells throughout the body, including blood cells. Blood cells fight infection, help the blood to clot, and carry oxygen to all parts of the body. When anticancer drugs damage blood cells, patients are more likely to get infections, may bruise or bleed easily, and may have less energy. Cells in hair roots and cells that line the digestive tract also divide rapidly. As a result, patients may lose their hair and may have other side effects such as poor appetite, nausea and vomiting, or mouth sores. Usually, these side effects go away gradually during the recovery periods between treatments or after treatment is complete. The health care team can suggest ways to relieve side effects.

Radiation Therapy

The side effects of radiation therapy depend mainly on the treatment dose and the part of the body that is treated. Patients are likely to become very tired during radiation therapy, especially in the later weeks of treatment. Resting is important, but doctors usually advise patients to try to stay as active as they can.

Radiation therapy to the chest and abdomen may cause nausea, vomiting, diarrhea, or urinary discomfort. Radiation therapy also may cause a decrease in the number of healthy white blood cells, cells that help protect the body against infection. Although the side effects of radiation therapy can be distressing, the doctor can usually treat or control them.

Pain Control

Pain is a common problem for people with liver cancer. The tumor can cause pain by pressing against nerves and other organs. Also, therapies for liver cancer may cause discomfort.

The patient’s doctor or a specialist in pain control can relieve or reduce pain in several ways:

- **Pain medicine**—Medicines often can relieve pain. (These medicines may make people drowsy and constipated, but resting and taking laxatives can help.)
- **Radiation**—High-energy rays can help relieve pain by shrinking the tumor.
- **Nerve block**—The doctor may inject alcohol into the area around certain nerves in the abdomen to block the pain.

The health care team may suggest other ways to relieve or reduce pain. For example, massage, *acupuncture*, or *acupressure* may be used along with other approaches. Also, the patient may learn to relieve pain through relaxation techniques such as listening to slow music or breathing slowly and comfortably.

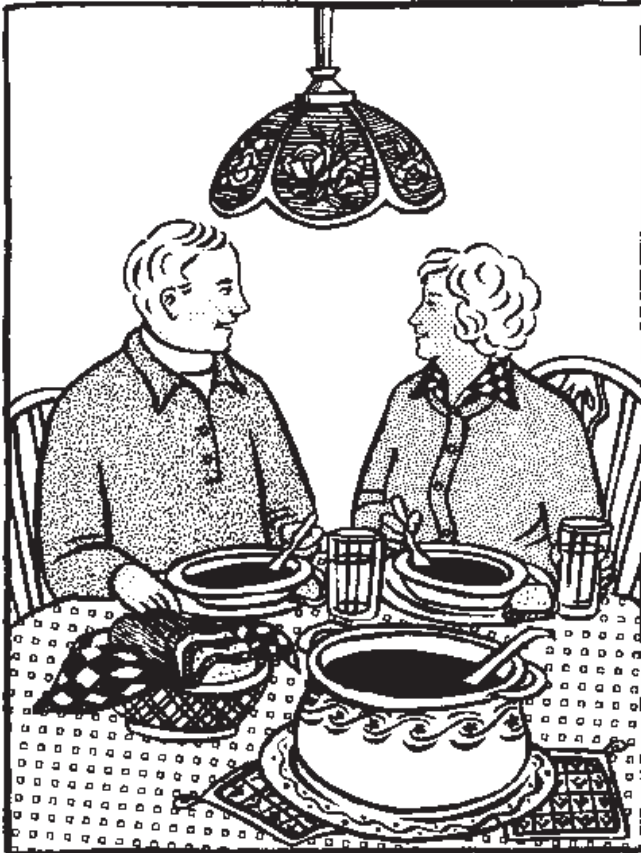
More information about pain control can be found in the NCI publications called *Pain Control: A Guide for People with Cancer and Their Families*, *Get Relief from Cancer Pain*, and *Understanding Cancer Pain*. The Cancer Information Service can send these booklets.

Nutrition

People with liver cancer may not feel like eating, especially if they are uncomfortable or tired. Also, the side effects of treatment can make eating difficult. Foods may smell or taste different. Nevertheless, patients should try to eat enough calories and protein to control weight loss, maintain strength, and promote healing. Also, eating well often helps people with cancer feel better and have more energy.

Careful planning and checkups are important. Liver cancer and its treatment may make it hard for patients to digest food and maintain their weight. The doctor will check the patient for weight loss, weakness, and lack of energy.

The doctor, dietitian, or other health care provider can advise patients about ways to have a healthy diet during treatment. Patients and their families may want to read the National Cancer Institute booklet *Eating Hints for Cancer Patients*, which contains many useful suggestions and recipes. The section “National Cancer Institute Booklets” tells how to get this publication.



Continuing Care

Continuing care for patients with liver cancer depends on the stage of their disease and the treatments they have received. Followup is very important after surgery to remove cancer from the liver. This is because the cancer can return in the liver or in another part of the body. People who have had liver cancer surgery may wish to discuss the chance of recurrence with the doctor. Followup care may include blood tests, x-rays, ultrasound tests, CT scans, angiograms, or other tests.

For people who have had a liver transplant, the doctor will test how well the new liver is working. The doctor also will watch the patient closely to make sure the new liver is not being rejected. People who have had a liver transplant may want to discuss with the doctor the type and schedule of followup tests that will be needed.

For patients with advanced disease, the health care team will focus on keeping the patient as comfortable as possible. Medicines and other measures can help with digestion, reduce pain, or relieve other symptoms.

Support for People with Liver Cancer

Having a serious disease such as liver cancer is not easy. Some people find they need help coping with the emotional and practical aspects of their disease. Support groups can help. In these groups, patients or their family members get together to share what they have learned about coping with the disease and the effects of treatment. Patients may want to talk with a member of their health care team about finding a support group. Groups may offer support in person, over the telephone, or on the Internet.

Patients may worry about caring for their families, holding on to their jobs, or keeping up with daily activities. Concerns about treatments and managing side effects, hospital stays, and medical bills are also common. Doctors, nurses, and other members of the health care team will answer questions about treatment, working, or other activities. Meeting with a social worker, counselor, or member of the clergy can be helpful to those who want to talk about their feelings or discuss their concerns. Often, a social worker can suggest resources for emotional support, financial aid, transportation, or home care.

Printed materials on coping are available from the Cancer Information Service (1-800-4-CANCER) and through other sources listed in the “National Cancer Institute Information Resources” section. The Cancer Information Service can also provide information to help patients and their families locate the programs and services they need.

The Promise of Cancer Research

Laboratory scientists are studying the liver to learn more about what may cause liver cancer and how liver cancer cells work. They are looking for new therapies to kill cancer cells.

Doctors in hospitals and clinics are conducting many types of clinical trials. These are research studies in which people take part voluntarily. In these trials, researchers are studying ways to treat liver cancer that have shown promise in laboratory studies. Research has led to advances in treatment methods, but controlling liver cancer remains a challenge. Scientists continue to search for more effective ways to treat this disease.

Patients who join clinical trials have the first chance to benefit from new treatments. They also make an important contribution to medical science. Although clinical trials may pose some risks, researchers take very careful steps to protect people.

Currently, clinical trials involve chemotherapy, chemoembolization, and radiofrequency ablation for the treatment of liver cancer. Another approach under study is *biological therapy*, which uses the body's natural ability (*immune system*) to fight cancer. Biological therapy is being studied in combination with chemotherapy.

Patients who are interested in joining a clinical study should talk with their doctor. They may want to read *Taking Part in Clinical Trials: What Cancer Patients Need To Know*. This NCI booklet describes how treatment studies are carried out and explains their possible benefits and risks. NCI's cancerTrials™ Web site at <http://cancertrials.nci.nih.gov> provides general information about clinical trials. It also offers detailed information about specific ongoing studies of liver cancer by linking to PDQ®, NCI's cancer information database. The Cancer Information Service at 1-800-4-CANCER can answer questions about cancer clinical trials and can provide information from the PDQ database.

Dictionary

Abdomen (AB-do-men): The area of the body that contains the pancreas, stomach, intestine, liver, gallbladder, and other organs.

Acupressure: The application of pressure or localized massage to specific sites on the body to control symptoms such as pain or nausea. Also used to stop bleeding.

Acupuncture: The technique of inserting thin needles through the skin at specific points on the body to control pain and other symptoms.

Aflatoxins (AF-la-TOK-sins): Harmful substances made by certain types of mold (*Aspergillus flavus* and *Aspergillus parasiticus*) that are often found on poorly stored grains and nuts. Consumption of foods contaminated with aflatoxins is a risk factor for primary liver cancer.

Alpha-fetoprotein (AL-fa-FEE-toe-PRO-teen): AFP. A protein normally produced by a fetus. AFP levels are usually undetectable in the blood of healthy adult men or women (who are not pregnant). An elevated level of AFP suggests the presence of either a primary liver cancer or germ cell tumor.

Anesthesia (an-es-THEE-zha): Drugs or substances that cause loss of feeling or awareness. Local anesthetics cause loss of feeling in a part of the body. General anesthetics put the person to sleep.

Angiogram (AN-jee-o-gram): An x-ray of blood vessels; the person receives an injection of dye to outline the vessels on the x-ray.

Ascites (ah-SYE-teez): Abnormal buildup of fluid in the abdomen.

Benign (beh-NINE): Not cancerous; does not invade nearby tissue or spread to other parts of the body.

Bile: A fluid made by the liver and stored in the gallbladder. Bile is excreted into the small intestine, where it helps digest fat.

Biological therapy (by-o-LAHJ-i-kul): Treatment to stimulate or restore the ability of the immune system to fight infection and disease. Also used to lessen side effects that may be caused by some cancer treatments. Also known as immunotherapy, biotherapy, or biological response modifier (BRM) therapy.

Biopsy (BY-ahp-see): The removal of cells or tissues for examination under a microscope. When only a sample of tissue is removed, the procedure is called an incisional biopsy or core biopsy. When an entire tumor or lesion is removed, the procedure is called an excisional biopsy. When a sample of tissue or fluid is removed with a needle, the procedure is called a needle biopsy or fine-needle aspiration.

Cancer: A term for diseases in which abnormal cells divide without control. Cancer cells can invade nearby tissues and can spread through the bloodstream and lymphatic system to other parts of the body.

Catheter (KATH-i-ter): A flexible tube used to deliver fluids into or withdraw fluids from the body.

Cell: The individual unit that makes up all of the tissues of the body. All living things are made up of one or more cells.

Chemoembolization: A procedure in which the blood supply to the tumor is blocked surgically or mechanically, and anticancer drugs are administered directly into the tumor. This permits a higher concentration of drug to be in contact with the tumor for a longer period of time.

Chemotherapy (kee-mo-THER-a-pee): Treatment with anticancer drugs.

Chronic: A disease or condition that persists or progresses over a long period of time.

Cirrhosis: A type of chronic, progressive liver disease in which liver cells are replaced by scar tissue.

Clinical trial: A research study that tests how well new medical treatments or other interventions work in people. The study tests new methods of screening, prevention, diagnosis, or treatment of a disease.

Core biopsy: The removal of a tissue sample with a needle for examination under a microscope.

Cryosurgery (KRY-o-SIR-jer-ee): Treatment performed with an instrument that freezes and destroys abnormal tissues.

CT scan: Computed tomography scan. A series of detailed pictures of areas inside the body taken from different angles; the pictures are created by a computer linked to an x-ray machine. Also called computerized tomography and computerized axial tomography (CAT) scan.

Enzyme: A protein that speeds up chemical reactions in the body.

Fine-needle aspiration: The removal of tissue or fluid with a needle for examination under a microscope. Also called needle biopsy.

Gastroenterologist (GAS-tro-en-ter-AHL-o-jist): A doctor who specializes in diagnosing and treating disorders of the digestive system.

General anesthesia (an-es-THEE-zha): Drugs that cause loss of feeling or awareness and put the person to sleep.

Hepatectomy: Surgery to remove all or part of the liver.

Hepatic: Refers to the liver.

Hepatic arterial infusion: Putting drugs by catheter into the hepatic artery, the major vessel that supplies the liver with blood.

Hepatic artery: The artery that carries blood to the liver.

Hepatic portal vein: A short blood vessel that carries blood to the liver from the stomach and intestine.

Hepatitis (hep-a-TYE-tis): Disease of the liver causing inflammation. Symptoms include an enlarged liver, fever, nausea, vomiting, abdominal pain, and dark urine.

Hepatitis B virus: A virus that causes hepatitis. It is carried and passed to others through blood or sexual contact. Also, infants born to infected mothers may become infected with the virus.

Hepatitis C virus: A virus that causes hepatitis. It is carried and passed to others through blood or sexual contact. Also, infants born to infected mothers may become infected with the virus.

Hepatoblastoma (HEP-a-toe-blas-TOE-ma): A type of liver tumor that occurs in infants and children.

Hepatocellular carcinoma (HEP-a-toe-SEL-yoo-ler kar-sin-O-ma): A type of adenocarcinoma, the most common type of liver tumor.

Hepatocyte (HEP-a-toe-site): A liver cell.

Hepatoma (hep-a-TOE-ma): A liver tumor.

Imaging: Tests that produce pictures of areas inside the body.

Immune system (im-YOON): The complex group of organs and cells that defends the body against infection or disease.

Incision (in-SIH-zhun): A cut made in the body to perform surgery.

Intestine (in-TES-tin): A long, tube-shaped organ in the abdomen that completes the process of digestion. There is both a large intestine and a small intestine. Also called the bowel.

Intravenous (in-tra-VEE-nus): IV. Within a blood vessel.

Jaundice (JAWN-dis): A condition in which the skin and the whites of the eyes become yellow, urine darkens, and stool becomes lighter in color. Jaundice occurs when the liver is not working properly or when a bile duct is blocked.

Laparoscope: A thin, lighted tube used to look at tissues and organs inside the abdomen.

Laser (LAY-zer): A device that concentrates light into an intense, narrow beam used to cut or destroy tissue. It is used in microsurgery, photodynamic therapy, and for a variety of diagnostic purposes.

Liver: A large organ located in the upper abdomen. The liver cleanses the blood and aids in digestion by secreting bile.

Lobe: A portion of an organ such as the liver, lung, breast, or brain.

Local anesthesia (an-es-THÉE-zha): Drugs that cause a temporary loss of feeling in one part of the body. The patient remains awake but cannot feel the part of the body treated with the anesthetic.

Local therapy: Treatment that affects cells in the tumor and the area close to it.

Lymphatic system (lim-FAT-ik): The tissues and organs that produce, store, and carry white blood cells that fight infection and other diseases. This system includes the bone marrow, spleen, thymus, lymph nodes, and a network of thin tubes that carry lymph and white blood cells. These tubes branch, like blood vessels, into all the tissues of the body.

Malignant (ma-LIG-nant): Cancerous; a growth with a tendency to invade and destroy nearby tissue and spread to other parts of the body.

Medical oncologist (on-KOL-o-jist): A doctor who specializes in diagnosing and treating cancer using chemotherapy, hormonal therapy, and biological therapy. A medical oncologist often serves as the main caretaker of someone who has cancer and coordinates treatment provided by other specialists.

Metastasis (meh-TAS-ta-sis): The spread of cancer from one part of the body to another. Tumors formed from cells that have spread are called “secondary tumors” and contain cells that are like those in the original (primary) tumor. The plural is metastases.

Metastasize (meh-TAS-ta-size): To spread from one part of the body to another. When cancer cells metastasize and form secondary tumors, the cells in the metastatic tumor are like those in the original (primary) tumor.

Microwave therapy: Treatment that destroys tissue with heat.

Mold: A form of fungus. Some molds can cause disease in humans.

MRI: Magnetic resonance imaging (mag-NET-ik REZ-o-nans IM-a-jing). A procedure in which a magnet linked to a computer is used to create detailed pictures of areas inside the body.

Outpatient: A patient who visits a clinic or hospital for diagnosis or treatment but who does not spend the night.

Palliative therapy: Treatment given to relieve symptoms caused by advanced cancer. Palliative therapy does not alter the course of a disease but can improve the quality of life.

Parasite: An animal or a plant that lives on or in an organism of another species and gets at least some of its nutrition from that other organism.

Pathologist (pa-THOL-o-jist): A doctor who identifies diseases by studying cells and tissues under a microscope.

Percutaneous ethanol injection (per-kyoo-TAN-ee-us): An injection of ethanol (alcohol) directly into the tumor to kill cancer cells.

Primary tumor: The original tumor.

Radiation oncologist (ray-dee-AY-shun on-KOL-o-jist): A doctor who specializes in using radiation to treat cancer.

Radiation therapy (ray-dee-AY-shun): The use of high-energy radiation from x-rays, gamma rays, neutrons, and other sources to kill cancer cells and shrink tumors. Radiation may come from a machine outside the body (external-beam radiation therapy), or it may come from radioactive material that is placed in the body in the area near cancer cells (internal radiation therapy, implant radiation, or brachytherapy). Systemic radiation therapy uses a radioactive substance, such as a radiolabeled monoclonal antibody, that circulates throughout the body. Also called radiotherapy.

Radiofrequency ablation: The use of electrodes to heat and destroy abnormal tissue.

Resectable (ree-SEK-tuh-bull): Able to be removed with surgery.

Risk factor: A substance, agent, genetic alteration, trait, habit, or condition that increases a person's chance of developing a disease.

Secondary tumor: Cancer that has spread from the organ in which it first appeared to another organ. For example, breast cancer cells may spread (metastasize) to the lungs and cause the growth of a new tumor. When this happens, the disease is called metastatic breast cancer, and the tumor in the lungs is called a secondary tumor. Also called secondary cancer.

Side effects: Problems that occur when treatment affects healthy cells. Common side effects of cancer treatment are fatigue, nausea, vomiting, decreased blood cell counts, hair loss, and mouth sores.

Sonogram (SON-o-gram): A computer picture of areas inside the body created when sound waves bounce off organs and other tissues. Also called ultrasonogram or ultrasound.

Spleen: An organ that is part of the lymphatic system. The spleen produces lymphocytes, filters the blood, stores blood cells, and destroys old blood cells. It is located on the left side of the abdomen near the stomach.

Stage: The extent of a cancer within the body, especially whether the disease has spread from the original site to other parts of the body.

Staging: Performing exams and tests to learn the extent of the cancer within the body, especially whether the disease has spread from the original site to other parts of the body.

Surgeon: A doctor who removes or repairs a part of the body by operating on the patient.

Surgery: A procedure to remove or repair a part of the body or to find out whether disease is present. An operation.

Symptom: An indication that a person has a condition or disease. Some examples of symptoms are headache, fever, fatigue, nausea, vomiting, and pain.

Systemic therapy (sis-TEM-ik): Treatment using substances that travel through the bloodstream, reaching and affecting cells all over the body.

Tissue (TISH-oo): A group or layer of cells that are alike and that work together to perform a specific function.

Transplant surgeon: A doctor who specializes in transplantation surgery. The surgeon replaces a patient's organ with one from another person.

Transplantation: The replacement of an organ with one from another person.

Tumor (TOO-mer): An abnormal mass of tissue that results from excessive cell division. Tumors perform no useful body function. They may be benign (not cancerous) or malignant (cancerous).

Ultrasound test: A test that bounces sound waves off tissues and internal organs and changes the echoes into pictures (sonograms).

Unresectable (un-ree-SEK-tuh-bull): Not able to be removed with surgery.

Vaccine: A substance or group of substances meant to cause the immune system to respond to a tumor or to microorganisms, such as bacteria or viruses. A vaccine can help the body recognize and destroy cancer cells or microorganisms.

Virus (VYE-rus): A microorganism that can infect cells and cause disease. In cancer therapy, some viruses may be made into vaccines that help the body build an immune response to, and kill, tumor cells.

X-ray: A type of high-energy radiation. In low doses, x-rays are used to diagnose diseases by making pictures of the inside of the body. In high doses, x-rays are used to treat cancer.

National Cancer Institute Information Resources

You may want more information for yourself, your family, and your doctor. The following National Cancer Institute (NCI) services are available to help you.

Telephone

Cancer Information Service (CIS)

Provides accurate, up-to-date information on cancer to patients and their families, health professionals, and the general public. Information specialists translate the latest scientific information into understandable language and respond in English, Spanish, or on TTY equipment.

Toll-free: 1-800-4-CANCER (1-800-422-6237)

TTY: 1-800-332-8615

Internet

<http://cancer.gov>

NCI's Web site contains comprehensive information about cancer cause and prevention, screening and diagnosis, treatment and survivorship; clinical trials; statistics; funding, training, and employment opportunities; and the Institute and its programs.

Fax

CancerFax[®]

Includes NCI information about cancer treatment, screening, prevention, and supportive care. To obtain a contents list, dial 1-800-624-2511 or 301-402-5874 from your touch-tone phone or fax machine hand set and follow the recorded instructions.

National Cancer Institute Booklets

National Cancer Institute (NCI) publications can be ordered by writing to the address below, and some can be viewed and downloaded from <http://cancer.gov/publications> on the Internet.

Publications Ordering Service
National Cancer Institute
Building 31, Room 10A31
31 Center Drive, MSC 2580
Bethesda, MD 20892–2580

In addition, people in the United States and its territories may order these and other NCI booklets by calling the Cancer Information Service at 1–800–4–CANCER. They may also order many NCI publications on-line at <http://cancer.gov/publications>.

Booklets About Cancer Treatment

- *Chemotherapy and You: A Guide to Self-Help During Treatment*
- *Help Yourself During Chemotherapy: 4 Steps for Patients*
- *Radiation Therapy and You: A Guide to Self-Help During Treatment*
- *Eating Hints for Cancer Patients*
- *Understanding Cancer Pain*
- *Pain Control: A Guide for People with Cancer and Their Families*
- *Get Relief from Cancer Pain*
- *Taking Part in Clinical Trials: What Cancer Patients Need To Know*

- *La quimioterapia y usted: Una guía de autoayuda durante el tratamiento del cáncer (Chemotherapy and You: A Guide to Self-Help During Treatment for Cancer)*
- *El tratamiento de radioterapia: Guía para el paciente durante el tratamiento (Radiation Therapy and You: A Guide to Self-Help During Treatment)*
- *El dolor relacionado con el cáncer (Understanding Cancer Pain)*
- *¿En qué consisten los estudios clínicos? Un folleto para los pacientes de cáncer (What Are Clinical Trials All About? A Guide for Cancer Patients)*

Booklets About Living With Cancer

- *Taking Time: Support for People With Cancer and the People Who Care About Them*
- *When Cancer Recurs: Meeting the Challenge*
- *Advanced Cancer: Living Each Day*

This booklet was written and published by the National Cancer Institute (NCI), 31 Center Drive, MSC 2580, Bethesda, MD 20892–2580. The NCI, the largest component of the National Institutes of Health, coordinates a national research program on cancer causes and prevention, detection and diagnosis, and treatment. In addition, NCI’s mission includes dissemination of information about cancer to patients, the public, and health professionals.

The National Cancer Act, passed by Congress in 1971, made research a National priority. Since that time, the NCI, the lead Federal agency for cancer research, has collaborated with top researchers and facilities across the country to conduct innovative research leading to progress in cancer prevention, detection, diagnosis, and treatment. These efforts have resulted in a decrease in the overall cancer death rate, and have helped improve and extend the lives of millions of Americans.

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