



## TESTICULAR CANCER

### What is cancer?

Cancer develops when cells in a part of the body begin to grow out of control. Although there are many kinds of cancer, they all start because of out-of-control growth of abnormal cells.

Normal body cells grow, divide, and die in an orderly fashion. During the early years of a person's life, normal cells divide more rapidly until the person becomes an adult. After that, cells in most parts of the body divide only to replace worn-out or dying cells and to repair injuries.

Because cancer cells continue to grow and divide, they are different from normal cells. Instead of dying, they outlive normal cells and continue to form new abnormal cells.

Cancer cells develop because of damage to DNA. This substance is in every cell and directs all its activities. Most of the time when DNA becomes damaged the body is able to repair it. In cancer cells, the damaged DNA is not repaired. People can inherit damaged DNA, which accounts for inherited cancers. Many times though, a person's DNA becomes damaged by exposure to something in the environment, like smoking.

Cancer usually forms as a tumor. Some cancers, like leukemia, do not form tumors. Instead, these cancer cells involve the blood and blood-forming organs and circulate through other tissues where they grow.

Often, cancer cells travel to other parts of the body, where they begin to grow and replace normal tissue. This process is called metastasis. Regardless of where a cancer may spread, however, it is always named for the place it began. For instance, breast cancer that spreads to the liver is still called breast cancer, not liver cancer.

Not all tumors are cancerous. Benign (non-cancerous) tumors do not spread (metastasize) to other parts of the body and, with very rare exceptions, are not life threatening.

Different types of cancer can behave very differently. For example, lung cancer and breast cancer are very different diseases. They grow at different rates and respond to different treatments. That is why people with cancer need treatment that is aimed at their particular kind of cancer.

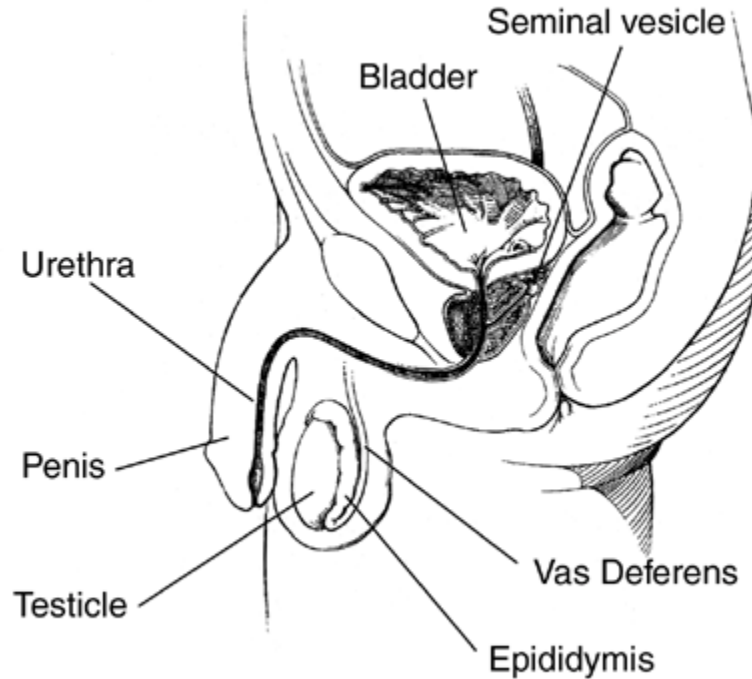
Cancer is the second leading cause of death in the United States. Nearly half of all men and a little over one third of all women in the United States will develop cancer during their lifetimes. Today, millions of people are living with cancer or have had cancer. The risk of developing most types of cancer can be reduced by changes in a person's lifestyle, for example, by quitting smoking and eating a better diet. The sooner a cancer is found and treatment begins, the better are the chances for living for many years.

## What Is Testicular Cancer?

Testicular cancer is cancer that typically develops in one or both testicles in young men. It is a highly treatable and usually curable type of cancer.

The testicles (also called the testes; a single testicle is called a testis) are a part of the male reproductive system. These 2 organs, each normally somewhat smaller than a golf ball in adult males, are contained within a sac of skin called the scrotum, which hangs beneath the base of the penis.

The testicles manufacture the male hormone testosterone. They also produce sperm. Sperm cells are carried from the testicle through the vas deferens to the seminal vesicles, where they are mixed with fluid produced by the prostate gland. During ejaculation, sperm cells, seminal vesicle fluid, and prostatic fluid enter the urethra, the tube in the center of the penis through which both urine and semen are passed.



The testicles have several types of cells, each of which may develop into one or more types of cancer. It is important to distinguish these types of cancers from one another because they differ in the ways they are treated and in their prognosis (the course of the disease and the outlook for survival).

## Germ Cell Tumors

More than 90% of cancers of the testicle develop in special cells known as germ cells. These are the cells that produce sperm. Two main types of germ cell tumors (GCTs) occur in men: *seminomas* and *nonseminomas*. Seminomas and nonseminomas cells look very different when seen under a microscope.

In the past, these 2 types occurred about equally. Now, seminomas may be slightly more common. Some cancers contain both nonseminoma and seminoma cells. These are treated as nonseminomas because they grow and spread like nonseminomas.

### Seminomas

Seminomas develop from the sperm-producing germ cells of the testicle. The 2 main subtypes of these tumors are classical (or typical) seminomas and spermatocytic seminomas.

Doctors can tell them apart by how they look under the microscope. More than 95% of seminomas are classical. These usually occur in men when they are between their late 30s and early 50s.

Spermatocytic seminoma tends to occur in older men. The average age of men diagnosed with spermatocytic seminoma is about 55, which is 10 to 15 years older than the average age of men with classical seminomas. Spermatocytic tumors tend to grow more slowly and are less likely to spread to other parts of the body than classical seminomas.

## Nonseminomas

This type of germ cell tumor usually occurs in men between their late teens and early 40s. There are 4 main types of nonseminoma tumors: embryonal carcinoma, yolk sac carcinoma, choriocarcinoma, and teratoma. Most tumors are mixed with at least 2 different types, but this does not change treatment. All nonseminoma germ cell cancers are treated the same way.

- **Embryonal carcinoma:** This type of nonseminoma germ cell cancer is present in about 40% of testicular tumors. Pure embryonal carcinomas occur only 3% to 4% of the time. When seen under a microscope, these tumors can look like tissues of very early embryos. This type of nonseminoma tends to grow rapidly and spread outside the testicle.
- **Yolk sac carcinomas:** These are so named because their cells look like the yolk sac of an early human embryo. Other names for this cancer include endodermal sinus tumors, infantile embryonal carcinoma, or orchidoblastoma. Yolk sac carcinoma is the most common form of testicular cancer in children. When they occur in children, these tumors usually are treated successfully. When yolk sac tumors develop in adults, however, they are of more concern, especially if they are "pure" (that is, the tumor does not contain other types of nonseminoma cells). Yolk sac carcinomas respond very well to chemotherapy, even if they have spread. This type of tumor releases a protein into the bloodstream known as alpha-fetoprotein (AFP). The presence of AFP helps confirm the diagnosis and is used to track the patient's response to treatment.
- **Choriocarcinomas:** This is a very rare and aggressive type of testicular cancer that occurs in adults. Such cancers are likely to spread rapidly to distant organs of the body, including the lungs, bone, and brain. Pure choriocarcinoma does not often occur in the testicles. More often, choriocarcinoma cells are present with other types of nonseminoma cells in a mixed germ cell tumor. This type of tumor produces a protein, human chorionic gonadotropin (HCG), which can be used to confirm diagnosis and to track the patient's response to treatment.
- **Teratomas:** Teratomas are germ cell tumors with areas that, when seen under the microscope, look like each of the 3 layers of a developing embryo: the endoderm

(innermost layer), mesoderm (middle layer), and ectoderm (outer layer). The 3 main types of these tumors are the mature teratoma, immature teratoma, and teratoma with malignant transformation.

**Mature teratomas** are tumors formed by cells similar to cells of adult tissues. They rarely spread to nearby tissues and distant parts of the body. They can usually be cured with surgery.

Sometimes deposits of mature teratoma are found after chemotherapy to treat a nonseminomatous mixed germ cell tumor is finished. These may be the part of a tumor that was left behind after chemotherapy has killed the other components of the tumors. Some experts believe that chemotherapy can change other types of nonseminoma into teratoma.

**Immature teratomas** are less well-developed cancers with cells that look like those of an early embryo. Unlike mature teratomas, this type is more likely to grow into surrounding tissues (invade) and to spread outside the testicle (metastasize). Also, this type can sometimes recur (come back) years after treatment.

**Teratoma with malignant transformation** is a very rare cancer. These cancers have some areas that look like mature teratomas but have other areas where the cells have become a type of cancer that develops outside of the testicle, in tissues such as muscles, glands of the lungs or intestines, or the brain.

## **Carcinoma in situ**

Testicular germ cell cancers may begin as a noninvasive form of the disease called *carcinoma in situ* (CIS) or *intratubular germ cell neoplasia*. Carcinoma-in-situ may not always progress to cancer. Researchers have estimated that it can take about 5 years for CIS to progress to the invasive form of germ cell cancer. It is hard to find carcinoma-in-situ before it develops into cancer because it generally causes no symptoms and often does not form a lump that you or the doctor can feel. The only way to diagnose testicular carcinoma in situ is to have a biopsy. Some cases are found incidentally (by accident) in men who have a testicular biopsy for some other reason, such as infertility. Experts don't agree about the best treatment for CIS. Since carcinoma-in-situ doesn't always become an invasive cancer, many doctors in this country consider observation (watchful waiting) to be the best treatment option.

When a testicular tumor like CIS becomes invasive, its cells are no longer just in the seminiferous tubules (where sperm cells are formed) but have grown into other structures of the testicle. These cancer cells can then spread through either the blood circulation or the lymph nodes (small, bean-shaped collections of white blood cells that fight infection) and lymphatic channels (fluid-filled vessels that connect the series of lymph nodes) to other parts of the body.

## Stromal Tumors

Tumors can also develop in the supportive and hormone-producing tissues, or stroma, of the testicles. These tumors are known as gonadal stromal tumors. They make up less than 4% of adult testicle tumors but up to 20% of childhood testicular tumors. The 2 main types are Leydig cell tumors and Sertoli cell tumors.

- **Leydig cell tumors:** These tumors develop from the Leydig cells in the testicle that normally produce male sex hormones (androgens like testosterone). Leydig cell tumors develop in both adults (75% of cases) and children (25% of cases). They often produce androgens but sometimes produce estrogens (female sex hormones). Most Leydig cell tumors do not spread beyond the testicle and are cured with surgery. Sometimes, however, these tumors do spread to other parts of the body. If they do metastasize, Leydig cell tumors have a poor prognosis because they do not respond well to chemotherapy or radiation therapy.
- **Sertoli cell tumors:** These tumors develop from normal Sertoli cells, which support and nourish the sperm-producing germ cells. Like the Leydig cell tumors, they are usually benign; however, if they spread, they tend to be resistant to chemotherapy and radiation therapy.

## Secondary Testicular Tumors

Secondary testicular tumors are those that start in another organ and then spread to the testicle. Lymphoma is the most common secondary testicular cancer. Testicular lymphoma is more common than primary testicular tumors in men older than 50. Their prognosis depends on the type and stage of lymphoma. The usual treatment is surgical removal, followed by radiation and/or chemotherapy. In children with acute leukemia, the leukemia cells can sometimes form a tumor in the testicle.

Cancers of the prostate, lung, skin (melanoma), kidney, and other organs also can spread to the testicles. The prognosis for these cancers is usually poor because these cancers generally have spread widely to other organs as well. Treatment depends on the specific type of cancer.

## What Are the Key Statistics About Testicular Cancer?

The American Cancer Society estimates that about 8,090 new cases of testicular cancer will be diagnosed during 2008 in the United States. It is estimated that 380 men will die of testicular cancer in 2008. The rate of testicular cancer has been increasing in many countries, including the United States. The increase is mostly in seminomas. Experts have not been able to find reasons for this increase. Lately, the rate of increase has slowed.

Testicular cancer is not common; a man's lifetime chance of developing testicular cancer is about 1 in 300. Because treatment is so successful, the risk of dying from this cancer is very low: about 1 in 5,000.

So you will understand some of the information about this cancer, it is important to explain some terms. The *5-year survival rate* refers to the percentage of patients who live at least 5 years after their cancer is diagnosed. Five-year rates are used to produce a standard way of discussing prognosis. Of course, many people live much longer than 5 years. *Five-year relative survival rates* compare the observed survival of people with testicular cancer with that expected for people without testicular cancer. This means that relative survival for testicular cancer refers only to deaths from testicular cancer.

Testicular cancer is one of the most curable forms of cancer. According to the National Cancer Institute, the 5-year relative survival rate for all men with this cancer is 96%. If the cancer hasn't spread outside the testicle, the 5-year relative survival rate is 99%. Even if the cancer has spread to nearby lymph nodes, the 5-year relative survival rate is 96%. If the cancer has spread beyond the lymph nodes, the 5-year survival rate is around 70%. There are nearly 140,000 men who have survived testicular cancer in the United States.

Keep in mind that 5-year survival rates are based on patients diagnosed and initially treated more than 5 years ago. Improvements in treatment can result in an even more favorable outlook for recently diagnosed patients.

## What Are the Risk Factors for Testicular Cancer?

A risk factor is anything that changes your chance of getting a disease such as cancer. Different cancers have different risk factors. For example, exposing skin to strong sunlight is a risk factor for skin cancer. Smoking is a risk factor for many cancers. But often, having a risk factor, or even several, does not mean that you will get the disease. Just as having no risk factors doesn't mean you won't get the disease.

Scientists have found few risk factors that make a man more likely to develop testicular cancer. Even if a man has one or more risk factors for this disease, it is impossible to know for sure how much that risk factor contributes to developing the cancer. Also, most men with testicular cancer do not have any of the known risk factors.

**Undescended testicle:** One of the main risk factors for testicular cancer is a condition called cryptorchidism, or undescended testicle(s). About 10% of cases of testicular cancer occur in men with a history of cryptorchidism. Normally, the testicles develop inside the abdomen of

the fetus and they descend into the scrotum before birth. In about 3% of boys, however, the testicles do not make it all the way down before the child is born. Sometimes the testicle remains in the abdomen. In other cases, the testicle starts to descend but remains stuck in the groin area.

Most of the time, undescended testicles continue moving down into the scrotum during the child's first year of life. If the testicle has not descended by the time a child turns 1 year old, it probably won't go down on its own. Sometimes a surgical procedure known as *orchiopexy* is necessary to bring the testicle down into the scrotum

Men with a history of an undescended testicle have an increased risk of testicular cancer. Some experts believe that the risk of testicular cancer may be somewhat higher for men whose testicle stayed in the abdomen as opposed to one that has descended at least partway. Although most cancers develop in the undescended testicle, up to 25% of cases occur in the normally descended testicle. Based on these observations, some doctors conclude that cryptorchidism doesn't actually cause testicular cancer but that there is something else that leads to both testicular cancer and abnormal positioning of one or both testicles.

There is some evidence that orchiopexy done when a child is younger can reduce the risk of his developing certain types of germ cell tumors. The best time to do this surgery to reduce the risk of testicular cancer is not clear. Experts in the United States recommend that orchiopexy be done soon after the child's first birthday for reasons (such as fertility) that are not related to cancer. A recent large study showed that those who had this surgery after the age of 12 were more likely to get testicular cancer than those who had orchiopexy at an earlier age.

**Family history:** A family history of testicular cancer increases the risk. If a man has the disease, there is an increased risk that one or more of his brothers or sons will also develop it. However, only about 3% of testicular cancer cases are actually found to occur in families, so that most men are unlikely to pass this disorder on to their children.

**HIV infection:** Some evidence has shown that men infected with the human immunodeficiency virus (HIV), particularly those with AIDS, are at increased risk. No other infections have been shown to increase testicular cancer risk.

**Carcinoma in situ:** This condition does not produce a mass or cause any symptoms. It isn't clear how often carcinoma in situ (CIS) in the testicles progresses to cancer. In some cases, CIS is found in men who have a testicular biopsy when they have a medical evaluation of infertility or have a testicle removed because of cryptorchidism. Doctors in Europe are more likely than the doctors in this country to look for (and treat) CIS. This may be why the figures for diagnosis and progression to cancer are lower in the United States than in parts of Europe.



**Cancer of the other testicle:** A history of testicular cancer is another risk factor. About 3% or 4% of men who have been cured of cancer in one testicle will eventually develop cancer in the other testicle.

**Age:** Ninety percent of testicular cancers occur between the ages of 20 and 54. But this cancer can affect males of any age, including infants and elderly men.

**Race and ethnicity:** The risk of testicular cancer among white men is about 5 times that of black men and more than 3 times that of Asian-American and American Indian men. The risk for Hispanics/Latinos falls between that of Asians and non-Hispanic/Latino whites. The reason for these differences is not known. Worldwide, the risk of developing this disease is highest among men living in the United States and Europe and lowest among men living in Africa or Asia.

**Body size:** Some studies have found that the risk of testicular cancer is somewhat higher in tall men but other studies have not.

## Do We Know What Causes Testicular Cancer?

The exact cause of most cases of testicular cancer is not known. However, scientists have found that the disease is associated with a number of other conditions, which are described in the section "What Are the Risk Factors for Testicular Cancer?" A great deal of research is being done to learn more about the causes.

During the past few years, researchers have learned much about certain changes in chromosomes and DNA that may cause normal testicular germ cells to develop into germ cell tumors. Chromosomes are giant molecules of DNA and protein that carry genetic information about inherited traits. Each sperm or egg cell has half as many chromosomes as other body cells. So, when the sperm and egg combine, the resulting fetus has a normal number of chromosomes --half of which are from each parent. This is why we tend to look like our parents.

*Meiosis* is the process by which germ cells with 46 chromosomes develop into sperm or egg cells with 23 chromosomes. Testicular germ cell tumors may form when something abnormal happens during meiosis. Instead of forming normal sperm cells with 23 chromosomes, all 46 chromosomes remain. Usually, these chromosomes become unstable and progressively more abnormal in their shape and number (often between 69 and 82). Testicular cancer cells often have extra copies of a part of chromosome 12 (this is called isochromosome 12p). Scientists are studying DNA from this chromosome to learn more about exactly what goes wrong during meiosis and how this might be prevented or reversed.

Several other abnormal chromosomes and changes in the factors that regulate cell division and the cell cycle have been associated with testicular cancer, both in animals and in humans. All of these changes are being studied to find the true causes of testicular cancer.

## Can Testicular Cancer Be Prevented?

Some of the known risk factors -- undescended testicle, white race, and a family history of the disease -- are unavoidable because they are present at birth. Also, many men with testicular cancer have no known risk factors. For these reasons, it is not possible now to prevent most cases of this disease. It is wise to correct cryptorchidism in male children, but experts disagree if this changes the child's risk for testicular cancer. It does seem that correcting cryptorchidism earlier in life is better than waiting until puberty. Furthermore, someone who knows that he has a risk factor such as cryptorchidism may be motivated to be more watchful and to practice testicular self-exam to allow an earlier diagnosis (see the section "Can Testicular Cancer Be Found Early?").

## Can Testicular Cancer Be Found Early?

Most testicular cancers can be found at an early stage. In some men, early testicular cancers cause symptoms that lead them to seek medical attention. Most of the time a lump on the testicle is the first sign. Unfortunately, however, some testicular cancers may not cause symptoms until after they have reached an advanced stage.

Most doctors agree that examining a man's testicles should be part of a general physical exam. The American Cancer Society (ACS) recommends a testicular exam as part of a routine cancer-related checkup.

The ACS advises men to be aware of testicular cancer and to see a doctor right away if they find a lump. Because regular testicular self-exams have not been studied enough to show they reduce the death rate from this cancer, the ACS does not recommend regular testicular self-exams for men unless they have specific testicular cancer risk factors.

However, some doctors think that finding a lump is an important factor in making men seek early treatment, and they recommend that all men perform monthly testicular self-exams after puberty.

Each man has to decide whether or not to do a monthly self-exam, so instructions for testicular examination are included in this section. If you have certain risk factors that increase your chance of developing testicular cancer (such as undescended testicle, previous germ cell tumor in one testicle, or a family history), you should seriously consider monthly self-exams and talk about it with your doctor.

The best time for you to examine your testicles is during or after a bath or shower, when the skin of the scrotum is relaxed.

- Hold the penis out of the way and examine each testicle separately.
- Hold the testicle between your thumbs and fingers with both hands and roll it gently between the fingers.
- Look and feel for any hard lumps or nodules (smooth rounded masses) or any change in the size, shape, or consistency of the testes.

You should be aware that each normal testis has an epididymis, which can feel like a small bump on the upper or middle outer side of the testis. Normal testicles also contain blood vessels, supporting tissues, and tubes that conduct sperm. Some men may confuse these with cancer at first. If you have any concerns, ask your doctor. A testicle can enlarge for many reasons other than cancer. Fluid can collect around the testicle to form a benign condition called a hydrocele. Other times, the veins in the testicle can dilate and cause enlargement and lumpiness around the testicle. This is called a varicocele. To be sure you have one of these conditions and not a tumor; you need to have a doctor examine you. The doctor may order an ultrasound exam (see the section “How is Testicular Cancer Diagnosed”). This is an easy and painless way of finding a tumor.

If you choose to examine your testicles, you will become familiar with what is normal and what is different. Always report any changes to your doctor without delay.

## How Is Testicular Cancer Diagnosed?

### Signs and Symptoms of Testicular Cancer

In about 90% of testicular cancer cases, men have a lump on a testicle or they may notice the testicle is swollen or larger. Sometimes the lump causes pain, but most of the time there is no pain at all. Men with testicular cancer may mention a feeling of heaviness or aching in the lower abdomen or scrotum.

In rare cases, men with germ cell cancer notice their breasts are sore or have grown. This symptom occurs because certain types of germ cell tumors secrete high levels of a hormone called human chorionic gonadotropin (HCG), which stimulates breast development. Blood tests can measure HCG levels. These tests are important in diagnosis, staging, and follow-up of some testicular cancers.

Like germ cell tumors, Leydig cell tumors and Sertoli cell tumors can also cause a lump in the testicle. The type of tumor can only be diagnosed by examining the tumor cells under a microscope. Leydig cell tumors, however, can produce androgens (male sex hormones) or estrogens (female sex hormones). These hormones may cause symptoms that provide clues to

the correct diagnosis. Breast growth or loss of sexual desire is a symptom of estrogen-producing tumors. Androgen-producing tumors may not cause any specific symptoms in men, but in boys they can cause growth of facial and body hair at an abnormally early age.

Even when testicular cancer has spread to other organs, only about 1 man in 4 may have symptoms. Lower back pain can be a sign that the cancer has spread to the lymph nodes in the abdomen. If the cancer has spread to the lungs, the man may notice trouble breathing (shortness of breath), chest pain, or a cough. Sometimes the man may even cough up blood.. Occasionally men will have abdominal pain, either from enlarged lymph nodes or metastasis (spread) to the liver. If the cancer has spread to the brain, it can cause headaches, This is not the way testicular cancer usually spreads.

Some men with testicular cancer have no symptoms at all, and their cancer is found during medical testing for other conditions. Sometimes imaging tests done to find the cause of infertility can uncover a small testicular cancer.

A number of non-cancerous conditions, such as testicle injury or inflammation, can produce symptoms similar to those of testicular cancer. Inflammation of the testicle, known as orchitis, can cause painful swelling. Epididymitis (inflammation of the epididymis) can also cause swelling and pain. Both of these can be caused by viral or bacterial infections. The mumps virus causes orchitis in about 1 man in 5 who contracts mumps as an adult.

If you have any of the signs or symptoms described above, see your doctor without delay. Remember, the sooner you get an accurate diagnosis, the sooner you can start treatment and the more effective your treatment will be. For more information, see the separate American Cancer Society document, *Do I Have Testicular Cancer?*

## Medical History and Physical Exam

The first step is for the doctor to take a complete medical history to check for risk factors and symptoms. During a physical exam, the doctor feels the testicles for swelling or tenderness and for the size and location of any lump. The doctor also feels your abdomen for enlarged lymph nodes, a sign that the cancer has spread to the lymph nodes found in the back of the abdomen (retroperitoneal lymph nodes).

## Ultrasound

An ultrasound can help doctors tell if a lump is solid or filled with fluid. This test uses sound waves to produce images of internal organs. A transducer (wand-like equipment) emits the sound waves and picks up the echoes as they bounce off the organs. A computer processes the pattern of echoes to produce an image that is displayed on a monitor. The echoes from most tumors differ from those of normal tissue. These patterns of echoes also can help distinguish some types of benign and malignant tumors from one another.

This is an easy test to have and it uses no radiation, which is why it is often used to look at developing fetuses. For most ultrasound exams, you simply lie on a table and a technician moves the transducer over the part of your body being examined. Usually, the skin is first lubricated with gel. The pattern of echoes reflected by tissues can be useful in distinguishing certain benign conditions (like hydrocele or varicocele), from a solid tumor that could be a cancer. If the lump is solid, then it may be a cancer and the doctor may recommend further tests or even immediate surgery to remove the tumor.

## Blood Tests

Some blood tests can help diagnose testicular tumors. Many testicular cancers secrete high levels of certain proteins, such as alpha-fetoprotein (AFP) and human chorionic gonadotropin (HCG). These proteins (called tumor markers) are important because when they are present in the blood, it suggests that there is a testicular tumor. A tumor may also increase the levels of an enzyme called lactate dehydrogenase (LDH). However, LDH levels can also be increased in conditions other than cancer.

Nonseminomas often raise AFP and HCG levels. Seminomas occasionally raise HCG levels but never AFP levels. A high LDH often (but not always) indicates widespread disease. Sertoli or Leydig cell tumors do not produce these substances. The levels of these proteins may not be elevated if the tumor is small. These tests are also useful to estimate how much cancer is present, to evaluate the response to therapy, and to make sure the tumor has not returned. For more information on tumor markers, see the section “How Is Testicular Cancer Staged?”

## Surgery

If the doctor sees a solid tumor on ultrasound, he or she will recommend surgery to remove it right away. The surgeon will try to remove the entire tumor with the testicle and spermatic cord. The spermatic cord contains blood and lymph vessels that may act as pathways for testicular cancer to spread to the rest of the body. To lessen the chance that cancer cells will spread, these vessels are tied off early in the operation. This is best done by operating through an incision in the groin. This operation is called a radical inguinal orchiectomy.

The entire specimen will be sent to the laboratory where a *pathologist* (a doctor specializing in laboratory diagnosis of diseases) examines the tissue under a microscope. If cancer cells are present, the pathologist sends back a report describing the type and extent of the cancer.

In rare cases, when a diagnosis of testicular cancer is uncertain, the doctor may perform a biopsy before removing the testicle. This is done in surgery. During this operation, the surgeon makes a cut in the groin, withdraws the testicle from the scrotum, and examines it without cutting the spermatic cord. If suspicious tissue is seen, a portion of the tissue is

removed and immediately examined by the pathologist. If cancer is found, the testicle and spermatic cord are removed. If the tissue is not cancerous, the testicle can often be returned to the scrotum, and treatment involves surgery to remove only the tumor or the use of appropriate medicines. Once the diagnosis is made, your doctor will order other imaging tests to see how advanced the cancer is.

## Imaging Tests

### **Chest x-ray**

This is a plain x-ray of your chest and can be taken in any outpatient setting. This test is done to see if your cancer has spread to your lungs or the lymph nodes in an area of the chest known as the mediastinum. If the x-ray result is normal, you probably don't have cancer in your lungs. But most doctors feel a computed tomography (CT scan) (see next section) can better judge whether the cancer has spread to the chest.

### **Computed tomography**

The computed tomography (CT) scan is an x-ray procedure that produces detailed cross-sectional images of your body. Instead of taking one picture, like a conventional x-ray, a CT scanner takes many pictures of the part of your body being studied as it rotates around you. A computer then combines these pictures into an image of a slice of your body.

CT scans are helpful in staging the cancer. They help tell if your cancer has spread into your lungs, liver, or other organs. They show the lymph nodes and distant organs where metastatic cancer might be present.

Before the first set of pictures is taken you may be asked to drink 1 or 2 pints of a contrast agent. This helps outline the intestine so that certain areas are not mistaken for tumors. You may also receive an IV (intravenous) line through which a different kind of contrast dye is injected. This helps better outline structures in your body.

The injection can cause some flushing (redness and warm feeling that may last hours to days). A few people are allergic to the dye and get hives. Rarely, more serious reactions like trouble breathing and low blood pressure can occur. Medication can be given to prevent and treat allergic reactions. Be sure to tell the doctor if you have ever reacted to any contrast material used for x-rays or if you have an allergy to shellfish.

CT scans take longer than regular x-rays and you need to lie still on a table while they are being done. But just like other computerized devices, they are getting faster and your stay might be pleasantly short. Also, you might feel a bit confined by the ring you have to lay in when the pictures are being taken.

CT scans are sometimes used to guide a biopsy needle precisely into a suspected metastasis. For this procedure, called a CT-guided needle biopsy, the patient remains on the CT scanning table while a radiologist advances a biopsy needle toward the location of the mass. CT scans are repeated until the doctors are confident that the needle is within the mass. A fine needle biopsy sample (tiny fragment of tissue) or a core needle biopsy sample (a thin cylinder of tissue about ½-inch long and less than 1/8-inch in diameter) is removed and examined under a microscope.

### **Magnetic resonance imaging**

Magnetic resonance imaging (MRI) scans use radio waves and strong magnets instead of x-rays. The energy from the radio waves is absorbed and then released in a pattern formed by the type of tissue and by certain diseases. A computer translates the pattern of radio waves given off by the tissues into a very detailed image of parts of the body. Not only does this produce cross-sectional slices of the body like a CT scanner, it can also produce slices that are parallel with the length of your body. A contrast material might be injected just as with CT scans but is used less often.

MRI scans are particularly helpful in examining the brain and spinal cord. MRI scans are a little more uncomfortable than CT scans. First, they take longer -- often up to an hour. Also, you have to be placed inside a tube, which is confining and can upset people with a fear of enclosed spaces. The machine also makes a thumping noise that you may find disturbing. Some places provide headphones with music to block this sound out. If you have problems with close spaces (claustrophobia), you should let your doctor know before the MRI.

### **Lymphangiogram**

Because of improvements in other diagnostic techniques, lymphangiograms are rarely done today. Most doctors prefer CT scans instead. For a lymphangiogram, a special dye is injected into a lymph vessel in the foot or leg. The dye travels to the lymph nodes. A special monitor displays x-ray images of the lymph system, which doctors can study to detect signs that cancer has spread to the lymph nodes. *Lymph nodes* are a network of small, bean-shaped collections of white blood cells that fight infection. Enlarged lymph nodes can be a sign of a spreading cancer, but they can also occur if your body is fighting an infection.

CT scans are used to examine lymph nodes more frequently than lymphangiograms. However, the technique is sometimes used for patients with early-stage nonseminomas who are being watched for signs of progression before getting more chemotherapy or radiation.

### **Positron emission tomography**

In the positron emission tomography (PET) scan, radioactive glucose (sugar) is injected into the patient's vein. Because cancers use sugar much faster than normal tissues, the cancerous tissue takes up the radioactive material. A scanner can spot the radioactive deposits. This test can be helpful for spotting small collections of cancer cells. It is sometimes useful for looking at enlarged lymph nodes that remain after chemotherapy. A PET scan may help the doctor decide if they contain scar tissue or active tumor. Often the PET scan is combined with a CT scan. This helps decide if abnormalities on the CT scan are cancer or something else.

## How Is Testicular Cancer Staged?

*Staging* is the process of finding out how far the cancer has spread. In addition to tests used to diagnose testicular cancer, imaging tests are also used to determine the stage.

The stage of your cancer is a very important factor in planning your treatment and estimating your prognosis. If you have testicular cancer, ask your cancer care team to explain staging in a way that you can understand. Knowing all you can about staging lets you take a more active role in making decisions about your treatment.

## The TNM Staging System

A staging system is a standardized way for your cancer care team to summarize and describe the extent of your cancer. Testicular cancer is staged using the TNM system created by the American Joint Committee on Cancer (AJCC).

The staging system of testicular cancer contains 4 key pieces of information:

**T** refers to how much the primary tumor has spread to tissues next to the testicle.

**N** describes how much the cancer has spread to regional (nearby) lymph nodes.

**M** indicates whether the cancer has metastasized (spread to nonregional [distant] lymph nodes or other organs of the body).

**S** is a special classification used only for testicular cancers. It indicates the serum levels of certain proteins ( tumor markers) that are produced by some testicular cancers.

Additional letters or numbers appear after T, N, M, and S to provide more details about each piece of information. The numbers 0 through 4 indicate increasing severity. The letters "is" after the T stand for in situ, which means the tumor is contained in one place and has not yet



penetrated to a deeper layer of tissue. The letter X after T, N, M, or S means "cannot be assessed" because the information is not known.

### **Primary tumor (T)**

TX: The primary tumor cannot be assessed

T0: There is no evidence of primary tumor

Tis: Carcinoma in situ (noninvasive cancer cells)

T1: The tumor has not spread beyond the testicle and the narrow tubules next to the testicles where sperm undergo final maturation (epididymis). Cancer cells are not found inside blood vessels or lymph vessels next to the tumor. The cancer may have grown through the inner layer surrounding the testicle (tunica albuginea) but not the outer layer covering the testicle (tunica vaginalis).

T2: Similar to T1 except that the cancer has spread to blood vessels, lymphatic vessels, or the tunica vaginalis

T3: The tumor invades the spermatic cord (which contains blood vessels, lymphatic vessels, nerves, and the vas deferens)

T4: The tumor invades the skin surrounding the testicles (scrotum)

### **Regional lymph nodes (N)**

NX: Regional (nearby) lymph nodes cannot be assessed

N0: No metastasis (spread) to regional lymph nodes is seen on x-rays

N1: There is metastasis in at least one lymph node, but no lymph node is larger than 2 cm (about 3/4 inch) in any dimension

N2: There is metastasis in at least one lymph node that is larger than 2 cm but is not bigger than 5 cm (2 inches) in any dimension

N3: There is metastasis to at least 1 lymph node that is larger than 5 cm in any dimension

If the lymph nodes were taken out during surgery, there is a slightly different classification:

pNX: Regional (nearby) lymph nodes cannot be assessed

pN0: There is no metastasis to regional lymph nodes

pN1: There is metastasis (spread) to 1 to 5 lymph nodes, with no lymph node larger than 2 cm (about 3/4 inch) across in greatest dimension

pN2: There is metastasis in at least one lymph node that is bigger than 2 cm but not larger than 5 cm; OR metastasis to more than 5 lymph nodes that aren't bigger than 5 cm (one inch) across (in greatest dimension); OR the cancer is growing out the side of the lymph node

pN3: There is metastasis to at least one lymph node that is bigger than 5 cm

### **Distant metastasis (M)**

MX: Distant metastasis cannot be assessed

M0: There is no distant metastasis (no spread to lymph nodes outside the area of the tumor or other organs, such as the lungs)

M1: Distant metastasis is present

M1a: The tumor has metastasized to distant lymph nodes or to the lung

M1b: the tumor has metastasized to organs, such as liver, brain, bone, and others

### **Serum tumor markers (S)**

	<b>LDH (U/liter)</b>	<b>HCG (mIU/ml)</b>	<b>AFP (ng/ml)</b>
Sx	Marker studies not available or not performed.		
S0	Normal	Normal	Normal
S1	<1.5 x Normal	<5,000	<1,000
S2	1.5--10 x Normal	5,000 - 50,000	1,000 - 10,000
S3	>10 x Normal	>50,000	>10,000

*Note: Normal values vary between laboratories. Check with your doctor for your specific ranges.*

*LDH = lactate dehydrogenase (measured in Units per liter [U/liter])*

*HCG = human chorionic gonadotropin (measured in milli-International Units per milliliter [mIU/ml])*

*AFP = alpha-fetoprotein (measured in nanograms per milliliter [n/ml])*

*< Means less than; > means more than.*

Using the TNM staging system, the descriptions of the tumor, lymph nodes, metastasis, and serum markers are combined in a process called *stage grouping* and assigned a stage using Roman numerals.

## STAGE GROUPING

Stage	T	N	M	S
Stage 0	Tis (in situ)	N0	M0	S0
Stage I	T1-4	N0	M0	SX
Stage IA	T1	N0	M0	S0
Stage IB	T2-T4	N0	M0	S0
Stage IS	Any T	N0	M0	S1-3
Stage II	Any T	N1-3	M0	SX
Stage IIA	Any T	N1	M0	S0-1
Stage IIB	Any T	N2	M0	S0-1
Stage IIC	Any T	N3	M0	S0-1
Stage III	Any T	Any N	M1	SX
Stage IIIA	Any T	Any N	M1a	S0-1
	Any T	Any N	M1a	S1
Stage IIIB	Any T	N1-3	M0	S2
	Any T	Any N	M1a	S2
Stage IIIC	Any T	N1-3	M0	S3
	Any T	Any N	M1a	S3
	Any T	Any N	M1b	Any S

Another application of the TNM system used for advanced disease takes into account the markers and classifies the cancer as low, medium, and poor outlook. Some doctors give more aggressive chemotherapy regimens to patients who are in a high-risk category.

Risk Status	Nonseminoma	Stages	Seminoma	Stages
Good Outlook	No non-lung* spread Good markers AFP < 1,000 HCG < 5,000 LDH < 1.5	IS (S1) IIA (S1) IIB (S1) IIC (S1) IIIA	No non-lung* spread AFP normal HCG and LDH can be any level	IIC IIIA IIIB IIIC
Intermediate Outlook	No non-lung* spread Intermediate markers AFP 1,000 - 10,000 HCG 5,000 - 50,000 LDH 1.5 - 10	IS (S2) IIC (S2) IIIB	Non-lung* spread AFP normal HCG and LDH can be any level	IIIC with non-lung* spread
Poor Outlook	Non-lung* spread High markers AFP > 10,000 HCG > 50,000	IS (S3) IIC (S3) All IIIC	None (seminoma is never classified as poor outlook)	

	LDH > 10			
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*\*Spread to sites such as the brain or liver (non-lung) generally indicates a poorer outlook.  
AFP = alpha-fetoprotein; HCG = human chorionic gonadotropin; LDH = lactate dehydrogenase  
< Means less than; > means greater than.*

The 5-year survival rate for patients with a good prognosis is 91%, for an intermediate prognosis it is 79%, and for a poor prognosis it is 48%. These survival rates are taken from a study of patients treated more than 10 years ago. Survival is likely to be better today.

## **Recurrent disease**

Recurrent disease means that the cancer has come back (recurred) after treatment. Testicular cancer may recur in the testicle (if it was not removed during surgery) or in another part of the body.

## **How Is Testicular Cancer Treated?**

*This information represents the views of the doctors and nurses serving on the American Cancer Society's Cancer Information Database Editorial Board. These views are based on their interpretation of studies published in medical journals, as well as their own professional experience.*

*The treatment information in this document is not official policy of the Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor.*

*Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.*

In recent years, much progress has been made in treating testicular cancer. Surgical methods have been refined, and doctors know more about the best ways to use chemotherapy and radiation to treat different types of testicular cancer.

After the cancer is diagnosed and staged, your cancer care team will discuss treatment options with you. You should take time and think about all of the choices. In choosing a treatment plan, factors to consider include the type and stage of the cancer, as well as your overall physical health. Seeking a second opinion is often a good idea. It can provide more information and help you feel good about the chosen treatment plan. Some insurance companies require a second opinion before they will agree to pay for treatments.

Where you are treated is important. There is no substitute for experience. You have the best chance for a good outcome if you go to a hospital that treats many patients with testicular cancer.

The 3 main methods of treatment for testicular cancer are surgery, radiation therapy, and chemotherapy.

## Surgery

As described in the section "How Is Testicular Cancer Diagnosed?" testicular cancer surgery removes the testicle (or testicles) containing the cancer. An incision is made in the groin, and the testicle is taken from the scrotum through the opening. A cut is made through the spermatic cord that attaches the testicle to the abdomen. This procedure is known as a *radical inguinal orchiectomy*. The surgeon takes special precautions to avoid spreading cancer cells into the surgical wound or dislodging them from the tumor in the bloodstream. All stages of testicular cancer are treated with surgery.

Depending on the type and stage of your cancer, some lymph nodes behind the abdomen may also be removed at the same time or during a second operation. This operation, called *retroperitoneal lymph node dissection*, can be a major operation. A large incision is often made to remove these lymph nodes. Approximately 5% to 10% of patients have temporary complications after surgery, such as bowel obstruction or wound infections. This is a difficult and long operation. It should be done by a surgeon who does them often. Experience counts.

In some cases, the surgeon can remove lymph nodes through a very small skin incision in the abdomen by using a laparoscope (a narrow lighted tube, which lets doctors operate on the abdomen without making a large incision and scar). Although laparoscopic surgery seems to be a lot easier for the patient, doctors are unsure as to whether it is as good as the open surgery in terms of safety and efficiency in removing all of the potentially cancerous lymph nodes.

In laparoscopic surgery, after being put to sleep, the patient is turned onto the side. Small "keyhole" incisions are made on the abdomen. The surgeon's hands are not inside the patient's body during surgery. A video camera and long instruments are inserted through these keyhole incisions. The surgeon sees the inside of the abdomen on a television monitor. Using these long instruments, the lymph nodes around the aorta and inferior vena cava (large blood vessels) can be removed through one of the keyhole incisions. The small incisions are closed and the patient is awakened. Patients recover much more quickly from this operation than the standard open procedure and are walking soon after surgery. The hospital stay ranges from 2 to 4 days. There is usually less pain and patients are eating sooner. This operation should only be done if the surgeon is very experienced in this procedure.

Surgery to remove retroperitoneal lymph nodes may damage nearby nerves that control ejaculation. If these nerves are damaged, when a male ejaculates, the sperm are not deposited

outside the body but rather end up deposited in the bladder. This is known as *retrograde ejaculation*. This type of surgery does not cause impotence - a man can still have erections and sexual intercourse after retroperitoneal lymph node dissection. Retrograde ejaculation can make it harder to father children. To save the normal ejaculation function, surgeons have developed a type of retroperitoneal lymph node surgery called nerve-sparing surgery that has a very high rate (in experienced hands) of success.

If both testicles are removed, sperm cells cannot be produced and a man becomes infertile. In some patients, after the affected testis is removed, surgery will not be performed on the retroperitoneal lymph nodes, but the patient is carefully watched with frequent clinical exams and CT scans. Also, without testicles, a man cannot produce testosterone. He will need to take supplements, either in the form of a gel, a patch, or a shot. Pills are generally not reliable sources of testosterone.

Testicular cancer often affects men who may still be trying to start a family or have more children. These men may wish to discuss nerve-sparing surgery with their doctors, as well as sperm banking (freezing and storing sperm cells obtained before treatment). Men with testicular cancer often have lower than normal sperm counts, which may make it difficult to collect a good sperm sample.

### **Sexual impact of losing one or both testicles**

Men with testicular cancer are usually young and may be concerned that their appearance has changed. They may be single and dating and worry about a partner's reaction, or they may be athletic and feel embarrassed by the missing testicle when in locker rooms. Since the operation also removes the cord above the testicle, that side of the scrotum can look and feel empty to them.

To restore a more natural look, a man can have a testicular prosthesis surgically implanted in his scrotum. The prosthesis is filled with saline (salt water), and it comes in different sizes to match the remaining testicle. When in place, it can look like a normal testicle. There can be a scar after the operation, but it is often partly hidden by pubic hair. Some men want to have a prosthesis and others do not. You should discuss your wishes with your surgeon before considering this surgery. It may also help to talk with someone who has had a testicular prosthesis, to see what their experience was like.

Losing a testicle usually has no effect on a man's ability to get an erection and have sex. Men who have had both testicles removed are also still able to have sex as long as they are getting enough testosterone.

### **Radiation Therapy**

Radiation therapy uses a beam of high-energy rays (such as gamma rays or x-rays) or particles (such as electrons, protons, or neutrons) to destroy cancer cells or slow their rate of growth. In treating testicular cancer, radiation is used mainly to kill cancerous cells that have spread to lymph nodes.

Radiation therapy for testicular cancer is delivered by a carefully focused beam of radiation from a machine outside the body. This is known as external beam radiation. The main drawback of this method is that the radiation also can destroy nearby healthy tissue along with the cancerous cells. Although uncommon, some men experience a skin reaction like sunburn. This slowly fades away. Other possible side effects include fatigue, nausea, or diarrhea.

To reduce the risk of side effects, doctors carefully figure out the exact dose you need and aim the beam as accurately as they can to hit the target. Generally, treatment of testicular cancer uses lower doses than those needed for other types of cancer. Special protective devices are placed over the remaining testicle to preserve fertility.

In general, radiotherapy is mainly used for patients with seminoma and does not seem to work well for nonseminomas. Sometimes it is used after orchiectomy (the operation to remove the testis) and is directed to the lymph nodes at the back of the abdomen (the retroperitoneal lymph nodes). This is to kill any tiny bits of cancer in those lymph nodes that can't be seen. Radiotherapy can also be used to treat small amounts of seminoma that are known to have spread to the nodes (based on changes seen on CT and PET scans).

## Chemotherapy

Chemotherapy is the use of drugs for treating cancer. The drugs can be swallowed in pill form, or they can be injected by needle into a vein or muscle. To treat testicular cancer, the drugs are usually given into a vein. Chemotherapy is considered systemic therapy. This means that the drug enters the bloodstream and circulates throughout the body to reach and destroy the cancer cells. Chemotherapy is an effective way to destroy any cancer cells that break off from the main tumor and travel in the bloodstream to lymph nodes or distant organs. Chemotherapy is often used to cure testicular cancer when it has spread outside the testicle. It is not used to treat the cancer in the testicle.

Most types of chemotherapy kill cancer cells directly. Using 2 or more drugs is often more effective than using any single drug. The main drugs used to treat testicular cancer are cisplatin, vinblastine, bleomycin, cyclophosphamide, etoposide, paclitaxel, and ifosfamide. These drugs are used in various combinations. The chemotherapy regimens most commonly used as the initial treatment for testicular cancer are cisplatin, etoposide, and bleomycin (called PEB), or cisplatin and etoposide (also known as EP). Some doctors believe that a more intensive regimen should be used for patients with high-risk disease, and may suggest a different combination of chemotherapy drugs or even a stem cell transplant. .

Drugs used in chemotherapy can also affect some of the normal, healthy cells in your body, causing side effects. Rapidly growing cells, such as the blood-producing cells of bone marrow, the cells of hair follicles, and the lining of the digestive tract, are particularly sensitive to chemotherapy. Among the possible early or acute side effects are:

- nausea and vomiting
- a decrease in appetite
- temporary loss of hair
- mouth sores
- increased risk of infections (due to low white blood cell counts)
- bleeding or bruising (due to low blood platelet counts)
- fatigue (due to low red blood cell counts)
- diarrhea or constipation

If you have side effects, your cancer care team can suggest steps to ease them. For example, there are very good drugs available to help prevent and control nausea and vomiting. For more information about chemotherapy and its side effects, please see the American Cancer Society document, *Understanding Chemotherapy: A Guide for Patients and Families*.

### **Long-term side effects of chemotherapy**

Some of the drugs used to treat testicular cancer can cause long-term side effects. Cisplatin can cause kidney damage; can damage small blood vessels, causing sensitivity to cold temperatures; and damage nerves, causing numbness, abnormal tingling, and hearing loss. Bleomycin can damage lungs, causing shortness of breath and trouble with physical activity. Development of a second cancer (usually leukemia, related to etoposide) is a very serious but fortunately, a rare side effect. It occurs in less than 1% of testicular cancer patients treated with chemotherapy. People who have had chemotherapy for testicular cancer seem to have a higher risk of heart problems later in life. Several studies have also suggested that this chemotherapy treatment can sometimes cause high blood cholesterol to develop over time, which may later require treatment.

### **Stem Cell Transplantation**

Current studies are exploring whether high-dose combination chemotherapy with stem cell transplantation may be valuable in treating some patients with advanced germ cell cancer as part of their first treatment. It is mostly used right now for testicular cancer that has come back after chemotherapy. For this treatment, blood-forming stem cells are collected from the bloodstream using a special machine. In the past the bone marrow was used, but this is done less often now. These stem cells are preserved by freezing, while the patient receives high-dose chemotherapy.



Because the doses of chemotherapy are so high, the chemotherapy destroys the patient's bone marrow stem cells. As a result, the patient is unable to produce infection-fighting white blood cells, platelets, and red blood cells needed to carry oxygen throughout the body. Although these problems would otherwise be fatal, they are overcome by returning the frozen stem cells to the patient after chemotherapy. This allows doctors to use extra high doses of chemotherapy that might increase the likelihood of curing some testicular cancers. For more information on stem cell transplantation see the American Cancer Society document, Bone Marrow and Peripheral Blood Stem Cell Transplants.

## **Clinical Trials**

You have had to make a lot of decisions since you've been told you have cancer. One of the most important decisions you will make is deciding which treatment is best for you. You may have heard about clinical trials being done for your type of cancer. Or maybe someone on your health care team has mentioned a clinical trial to you. Clinical trials are one way to get state-of-the-art cancer care. Still, they are not right for everyone.

Here we will give you a brief review of clinical trials. Talking to your health care team, your family, and your friends can help you make the best treatment choice for you.

### **What Are Clinical Trials?**

Clinical trials are carefully controlled research studies that are done with patients. These studies test whether a new treatment is safe and how well it works in patients, or they may test new ways to diagnose or prevent a disease. Clinical trials have led to many advances in cancer prevention, diagnosis, and treatment.

### **The Purpose of Clinical Trials**

Clinical trials are done to get a closer look at promising new treatments or procedures in patients. A clinical trial is only done when there is good reason to believe that the treatment, test, or procedure being studied may be better than the one used now. Treatments used in clinical trials are often found to have real benefits and may go on to become tomorrow's standard treatment.

Clinical trials can focus on many things, such as:

- new uses of drugs that are already approved by the US Food and Drug Administration (FDA)
- new drugs that have not yet been approved by the FDA
- non-drug treatments (such as radiation therapy)
- medical procedures (such as types of surgery)
- herbs and vitamins
- tools to improve the ways medicines or diagnostic tests are used
- medicines or procedures to relieve symptoms or improve comfort
- combinations of treatments and procedures

Researchers conduct studies of new treatments to try to answer the following questions:

- Is the treatment helpful?
- What's the best way to give it?
- Does it work better than other treatments already available?
- What side effects does the treatment cause?
- Are there more or fewer side effects than the standard treatment used now?
- Do the benefits outweigh the side effects?
- In which patients is the treatment most likely to be helpful?

### **Phases of Clinical Trials**

There are 4 phases of clinical trials, which are numbered I, II, III, and IV. We will use the example of testing a new cancer treatment drug to look at what each phase is like.

**Phase I clinical trials:** The purpose of a phase I study is to find the best way to give a new treatment safely to patients. The cancer care team closely watches patients for any harmful side effects.

For phase I studies, the drug has already been tested in lab and animal studies, but the side effects in patients are not fully known. Doctors start by giving very low doses of the drug to the first patients and increase the doses for later groups of patients until side effects appear or the desired effect is seen. Doctors are hoping to help patients, but the main purpose of a phase I trial is to test the safety of the drug.

Phase I clinical trials are often done in small groups of people with different cancers that have not responded to standard treatment, or that keep coming back (recurring) after treatment. If a drug is found to be reasonably safe in phase I studies, it can be tested in a phase II clinical trial.

**Phase II clinical trials:** These studies are designed to see if the drug works. Patients are given the best dose as determined from phase I studies. They are closely watched for an effect on the cancer. The cancer care team also looks for side effects.

Phase II trials are often done in larger groups of patients with a specific cancer type that has not responded to standard treatment. If a drug is found to be effective in phase II studies, it can be tested in a phase III clinical trial.

**Phase III clinical trials:** Phase III studies involve large numbers of patients -- most often those who have just been diagnosed with a specific type of cancer. Phase III clinical trials may enroll thousands of patients.

Often, these studies are randomized. This means that patients are randomly put in one of two (or more) groups. One group (called the control group) gets the standard, most accepted treatment. Another group (or more than one group) will get the new treatment being studied. All patients in phase III studies are closely watched. The study will be stopped early if the side effects of the new treatment are too severe or if one group has much better results than the others.

Phase III clinical trials are usually needed before the FDA will approve a treatment for use by the general public.

**Phase IV clinical trials:** Once a drug has been approved by the FDA and is available for all patients, it is still studied in other clinical trials (sometimes referred to as phase IV studies). This way more can be learned about short-term and long-term side effects and safety as the drug is used in larger numbers of patients with many types of diseases. Doctors can also learn more about how well the drug works, and if it might be helpful when used in other ways (such as in combination with other treatments).

### **What It Will Be Like to Be in a Clinical Trial**

If you are in a clinical trial, you will have a team of experts taking care of you and watching your progress very carefully. Depending on the phase of the clinical trial, you may receive more attention (such as having more doctor visits and lab tests) than you would if you were treated outside of a clinical trial. Clinical trials are specially designed to pay close attention to you.

However, there are some risks. No one involved in the study knows in advance whether the treatment will work or exactly what side effects will occur. That is what the study is designed to find out. While most side effects go away in time, some may be long-lasting or even life threatening. Keep in mind, though, that even standard treatments have side effects. Depending on many factors, you may decide to enter (enroll in) a clinical trial.

### **Deciding to Enter a Clinical Trial**

If you would like to take part in a clinical trial, you should begin by asking your doctor if your clinic or hospital conducts clinical trials. There are requirements you must meet to take part in any clinical trial. But whether or not you enter (enroll in) a clinical trial is completely up to you.

Your doctors and nurses will explain the study to you in detail. They will go over the possible risks and benefits and give you a form to read and sign. The form says that you understand the clinical trial and want to take part in it. This process is known as giving your informed consent. Even after reading and signing the form and after the clinical trial begins, you are free to leave the study at any time, for any reason.

Taking part in a clinical trial does not keep you from getting any other medical care you may need.

To find out more about clinical trials, talk to your cancer care team. Here are some questions you might ask:

- Is there a clinical trial that I could take part in?
- What is the purpose of the study?

- What kinds of tests and treatments does the study involve?
- What does this treatment do? Has it been used before?
- Will I know which treatment I receive?
- What is likely to happen in my case with, or without, this new treatment?
- What are my other choices and their pros and cons?
- How could the study affect my daily life?
- What side effects can I expect from the study? Can the side effects be controlled?
- Will I have to stay in the hospital? If so, how often and for how long?
- Will the study cost me anything? Will any of the treatment be free?
- If I am harmed as a result of the research, what treatment would I be entitled to?
- What type of long-term follow-up care is part of the study?
- Has the treatment been used to treat other types of cancers?

### **How Can I Find Out More About Clinical Trials That Might Be Right for Me?**

The American Cancer Society offers a clinical trials matching service for patients, their family, and friends. You can reach this service at 1-800-303-5691 or on our Web site at <http://clinicaltrials.cancer.org>.

Based on the information you give about your cancer type, stage, and previous treatments, this service can put together a list of clinical trials that match your medical needs. The service will also ask where you live and whether you are willing to travel so that it can look for a treatment center that you can get to.

You can also get a list of current clinical trials by calling the National Cancer Institute's Cancer Information Service toll free at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials Web site at [www.cancer.gov/clinicaltrials](http://www.cancer.gov/clinicaltrials).

For even more information on clinical trials, the American Cancer Society has a document called *Clinical Trials: What You Need to Know*. You can read this on the Web site, [www.cancer.org](http://www.cancer.org), or have it sent to you by calling 1-800-ACS-2345.

### **Complementary and Alternative Therapies**

When you have cancer you are likely to hear about ways to treat your cancer or relieve symptoms that are different from mainstream (standard) medical treatment. These methods can include vitamins, herbs, and special diets, or methods such as acupuncture or massage—among many others. You may have a lot of questions about these treatments. Here are some you may have thought of already:

- How do I know if a non-standard treatment is safe?
- How do I know if it works?

- Should I try one or more of these treatments?
- What does my doctor know/think about these methods? Should I tell the doctor that I'm thinking about trying them?
- Will these treatments cause a problem with my standard medical treatment?
- What is the difference between "complementary" and "alternative" methods?
- Where can I find out more about these treatments?

## **The Terms Can Be Confusing**

Not everyone uses these terms the same way, so it can be confusing. The American Cancer Society uses *complementary* to refer to medicines or methods that are used *along with* your regular medical care. *Alternative* medicine is a treatment used *instead of* standard medical treatment.

## **Complementary Methods**

Complementary methods, for the most part, are not presented as cures for cancer. Most often they are used to help you feel better. Some methods that can be used in a complementary way are meditation to reduce stress, acupuncture to relieve pain or aromatherapy or peppermint tea to relieve nausea. There are many others. Some of these methods are known to help, while others have not been tested. Some have been proven not to be helpful. A few have even been found harmful. However, some of these methods may add to your comfort and well-being.

There are many complementary methods that you can safely use right along with your medical treatment to help relieve symptoms or side effects, to ease pain, and to help you enjoy life more. For example, some people find methods such as aromatherapy, massage therapy, meditation, or yoga to be useful.

## **Alternative Methods**

Alternative methods are those that are used instead of standard medical care. These treatments have not been proven safe and effective in clinical trials. Some of these methods may even be dangerous and some have life-threatening side effects. The main danger with trying any of these is that you may lose the chance to benefit from standard treatment. Delays or interruptions in your standard medical treatment may give the cancer more time to grow. Most of these methods are not covered by insurance.

## **Deciding What to Do**

It is easy to see why people with cancer may consider alternative methods. You want to do all you can to fight the cancer. Sometimes mainstream treatments such as chemotherapy can be hard to take, or they may no longer be working.

Sometimes people suggest that their method can cure your cancer without having serious side effects, and it's normal to want to believe them. But the truth is that most non-standard methods of treatment have not been tested and proven to be effective for treating cancer. As you consider your options, here are 3 important steps you can take:

- Talk to your doctor or nurse about any method you are thinking about using.
- Check the list of "red flags" below.
- Contact the American Cancer Society at 1-800-ACS-2345 to learn more about complementary and alternative methods in general and to learn more about the specific methods you are thinking about.

### **Red Flags**

You can use the questions below to spot treatments or methods to avoid. A "yes" answer to any one of these questions should raise a "red flag."

- Does the treatment promise a cure for all or most cancers?
- Are you told not to use standard medical treatment?
- Is the treatment or drug a "secret" that only certain people can give?
- Does the treatment require you to travel to another country?
- Do the promoters attack the medical or scientific community?

### **The Decision Is Yours**

Decisions about how to treat or manage your cancer are always yours to make. If you are thinking about using a complementary or alternative method, be sure to learn about the method and talk to your doctor about it. With reliable information and input from your health care team, you may be able to safely use the methods that can help you while avoiding those that could be harmful.

## **Treatment Options by Stage**

### **Stage I germ cell tumors**

**Stage I seminomas** are usually treated with surgical removal of the testicle and spermatic cord (radical inguinal orchiectomy), followed by radiation aimed at regional lymph nodes (inguinal and retroperitoneal lymph nodes). Because seminoma cells are very sensitive to radiation, low doses can be used, for usually about 10 to 15 treatments. More than 95% of stage I seminomas can be cured this way.

The doctor may recommend radiation therapy even though CT scan results do not show that the cancer has spread to the nodes. This is because in approximately 20% of this type of testicular cancer, cancerous cells have spread but cannot be seen on imaging studies (like CT scans). Radiation therapy is usually successful in destroying these hidden (occult) metastases.

Another choice that works as well as radiation is to give a single dose of chemotherapy with the drug carboplatin after surgery.

Another approach to treating men with stage I seminomas is to not give radiation or chemotherapy right after surgery, but instead to watch patients closely for a few years. This means seeing the doctor and getting blood tests and imaging studies (chest x-rays and CT scans) every few months. If these tests do not find any signs that cancer has spread beyond the testicle, no additional treatment will be given. If metastasis is detected later, radiation or chemotherapy can still be used effectively. This approach is about as effective as immediate radiation therapy, particularly if the original testicular cancer was not larger than 6 cm (about 2½ inches) and if there is no evidence that the cancer has spread into lymphatic vessels or blood vessels.

One way doctors decide whether or not to treat is based on the size of the tumor and whether it invades nearby blood vessels. If the tumor is large or invades blood vessels, they may recommend treatment with either radiation or chemotherapy.

**Stage I nonseminoma** germ cell cancers are also highly curable (98%), but the standard treatment is different from that of seminomas. As with seminomas, the initial treatment is surgery to remove the testicle and tumor (radical inguinal orchiectomy). Then the treatment choices depend on the stage.

For Stage IA (T1) there are 2 choices:

- **Retroperitoneal lymph node dissection.** This has the advantage of a high cure rate but the disadvantages of major surgery, with its complications and possibly losing the ability to ejaculate normally.
- 
- **Careful observation with frequent doctor visits and tests for several years.** This is called surveillance. The advantage of surveillance is that there are no problems with surgery or chemotherapy side effects. The disadvantage is that you have to see the doctor a lot and get lots of x-rays and tests. For the first 2 years, the doctor visits and blood tests are every 1 to 2 months, and the CT scans are every 2 to 4 months. Without careful watching the cancer can come back (called a relapse) and can grow

so large that it may not be curable. So far, this has not happened in men who saw their doctor for follow-ups as scheduled. Most relapses (in 8 of 10 cases) occur in the first year after diagnosis, with most of the rest in the second year. Relapses are generally treated with chemotherapy.

For Stage IB (T2, T3, or T4) there are up to 3 options:

- 
- **Retroperitoneal lymph node dissection.**
- 
- **Surveillance** (careful observation with frequent doctor visits and tests for several years). This is usually not an option if the tumor is T3 or T4.
- 
- **Immediate treatment with 2 cycles of chemotherapy.** This option has a high cure rate but has the disadvantage of the side effects of chemotherapy (mostly the short-term effects, since 2 cycles cause fewer long-term effects).
- 

For Stage IS

If the tumor is stage IS, it means that the tumor markers (like AFP or HCG) are still high even after the testicle/tumor is removed. In that case, full-dose chemotherapy is recommended for 3 to 4 cycles.

Doctors have learned that certain features of the tumor mean that the cancer might come back. These depend on the blood test results and the way the cancer cells look under the microscope. If these features are present, doctors are less likely to recommend observation only.

## **Stage II germ cell tumors**

**Stage II seminomas** are treated differently depending on the size of the retroperitoneal lymph nodes.

In stages IIa and IIb, the lymph nodes are not larger than 5 cm (these stages were previously called "nonbulky" stage II). These stages are treated with surgery to remove the testicle (radical inguinal orchiectomy), followed by radiation to the retroperitoneal lymph nodes. Usually higher doses of radiation are given for stage II seminoma than for stage I seminoma. At one time, lymph nodes in the center of the chest were treated with radiation, but this is no longer recommended.

In stage IIc, the lymph nodes are larger than 5 cm (this stage was sometimes called "bulky" stage II). Stage IIc seminomas are treated with radical inguinal orchiectomy, followed by combination chemotherapy that includes 3 cycles of PEB (cisplatin, etoposide, and bleomycin) or 4 cycles of EP (etoposide and cisplatin). Radiotherapy is generally not used



for stage IIc seminoma. Chemotherapy is considered the best treatment for patients with this stage of seminoma.

For **Stage II nonseminoma** germ cell tumors the treatment depends on the tumor markers and the retroperitoneal lymph nodes. All men will have radical inguinal orchiectomy to remove the testicle with the tumor. After surgery, there are 2 main options: Retroperitoneal lymph node dissection (RPLND), then further treatment with chemotherapy if the lymph nodes have cancer in them. This usually is not done if the tumor marker levels stay high after the testicle with the tumor is removed or if the lymph nodes are large on CT scan.

Chemotherapy. Sometimes the doctor will recommend that the patient go straight to chemotherapy (without doing the RPLND surgery). This is more likely to happen if the retroperitoneal lymph nodes are very large on the CT scan or if the tumor marker levels (HCG and/or AFP) are high even after the testicle with the tumor is removed. The chemotherapy regimen usually is 4 courses of chemotherapy with EP (cisplatin and etoposide) or 3 to 4 cycles of the chemotherapy PEB (cisplatin, etoposide, and bleomycin).

After chemotherapy, a CT scan is repeated to see if the retroperitoneal lymph nodes are still enlarged. If they are, they are removed.

Again, if the tumor markers are high after orchiectomy, chemotherapy will probably be the first treatment and then surgery of the lymph nodes will be considered, depending on the results of CT and PET scans.

### **Stage III germ cell tumors**

**Stage III Germ Cell tumors (both seminomas and nonseminomas)** are treated with orchiectomy followed by chemotherapy with a combination of drugs. The main regimens are the same as those used for stage II testicular cancers (usually etoposide, cisplatin, and bleomycin). This treatment produces a cure in over 70% of cases.

Once chemotherapy is complete, the doctor looks for any cancer that remains. Sometimes a few tumors remain. These are most often in the lung or in the retroperitoneal lymph nodes. These are usually removed surgically and this may result in a cure. Patients whose cancer has metastasized to the brain usually receive chemotherapy plus radiation therapy aimed at the brain, although surgery for the brain tumor is another option.

If the tumor marker levels are very high then the usual chemotherapy treatment may not be successful and a clinical trial of more aggressive therapy may be the best choice.

Those who are not cured with the first chemotherapy drugs can be treated with other drugs. Sometimes the doctor will recommend stem cell transplant if regular chemotherapy is not

working. Patients should also consider enrolling in a clinical trial of other chemotherapy agents (for more information, see Clinical Trials in this section).

### **Recurrent germ cell tumors**

If the cancer goes away with treatment and then comes back, it is called recurrent or relapsed. Treatment of recurrent germ cell tumors depend on the initial stage and treatment. Cancer that comes back in the retroperitoneal lymph nodes can be treated by surgery (RPLND) if the recurrence is small (and if the only treatment given before was orchiectomy). Depending on the results of the surgery, chemotherapy may be recommended.

If it looks like there is a lot of recurring cancer in the retroperitoneal lymph nodes or if the cancer has returned elsewhere, then chemotherapy is usually recommended. This may be followed by surgery.

If a man's cancer recurs after chemotherapy with PEB or if his treatment is no longer working, then he will be treated with different drugs, typically, ifosfamide, cisplatin, and either etoposide, paclitaxel, or vinblastine.

The treatment of testicular cancer that has come back after chemotherapy is not always as effective as doctors would like. Therefore, many men whose disease comes back after chemotherapy receive high-dose chemotherapy followed by autologous blood stem cell transplantation. This may be a better option for men with recurrent disease, rather than standard chemotherapy. (See Stem Cell Transplantation in this section for more information.)

In general, if chemotherapy is no longer working, it is probably safest to seek a second opinion from a center of excellence with extensive experience in treating relapsed testicular cancer patients, before starting other treatments.

### **Sertoli cell and Leydig cell tumors**

Radical inguinal orchiectomy is usually recommended for Sertoli cell and Leydig cell tumors. Radiation therapy and chemotherapy are generally not effective in these rare types of testicle tumor. If the doctor suspects the tumor has metastasized beyond the testicle, retroperitoneal lymph nodes may be surgically removed.

### **More Treatment Information**

For more details on treatment options -- including some that may not be addressed in this document -- the National Comprehensive Cancer Network (NCCN) and the National Cancer Institute (NCI) are good sources of information.

The NCCN, made up of experts from 19 of the nation's leading cancer centers, develops cancer treatment guidelines for doctors to use when treating patients. Those are available on the NCCN Web site ([www.nccn.org](http://www.nccn.org)).

The NCI provides treatment information via telephone (1-800-4-CANCER) and its Web site ([www.cancer.gov](http://www.cancer.gov)). Information for patients as well as more detailed information intended for use by cancer care professionals is also available on [www.cancer.gov](http://www.cancer.gov).

## The Lance Armstrong Story

No one demonstrates better how far we have come in treating testicular cancer than Lance Armstrong. In 1996, this internationally-recognized bicycle racer began feeling a lowered energy level, started coughing blood, and had a painful testicle. He was found to have testicular cancer that had spread throughout his body to his lungs and brain.

After his testicle was removed, he received chemotherapy with cisplatin, etoposide, and ifosfamide (ifosfamide was used instead of bleomycin to avoid any damage to his lungs that would impair his bicycling). He also had surgery to remove 2 brain metastases (no radiation was given because of the concern that it also would affect his balance or coordination).

Lance completed his treatment by the end of that year, and by 1998, he was competing again. In 1999, he won the Tour de France, which some consider the most grueling athletic event in the world. He went on to win this event a record 7 consecutive times between 1999 and 2005. He also initiated the Lance Armstrong Foundation, a charitable organization dedicated to cure of cancer and coping with its consequences. You can read more information on Lance Armstrong's Web site at [www.laf.org](http://www.laf.org).

## What Should You Ask Your Doctor About Testicular Cancer?

As you deal with your cancer and the process of treatment, you need to have honest, open discussions with your cancer care team. You should feel free to ask any questions you might have, no matter how trivial they might seem. Among the questions you might want to ask are:

- What kind of testicular cancer do I have?
- Has my cancer spread beyond the primary site?
- What is the stage of my cancer? What does the staging mean in my case?
- What treatment choices do I have?
- How many retroperitoneal node dissections have you done?
- If you were to have treatment, what kind would you choose?
- Based on what you've learned about my cancer, what is my prognosis?
- What risks or possible side effects can I expect from my treatment?
- How long will it take me to recover from treatment?

- When can I go back to work after treatment?
- How soon after treatment can I have sex?
- What are the chances that my cancer will recur?
- What are the chances I will become infertile? Should I bank sperm?
- Does one type of treatment reduce the risk of recurrence more than another?
- What should I do to be ready for treatment?
- Do I need to get a second opinion before I start treatment, and when would a second opinion be helpful to me?

You will no doubt have other questions about your own personal situation. Be sure and write your questions down so you remember to ask them during each visit with your cancer care team. Keep in mind, too, that doctors are not the only ones who can give you information. Other health care professionals, such as nurses and social workers, may have the answers to your questions.

## What Happens After Treatment for Testicular Cancer?

Completing treatment can be both stressful and exciting. You will be relieved to finish treatment, yet it is hard not to worry about cancer coming back. (When cancer returns, it is called recurrence.) This is a very common concern among those who have had cancer.

It may take a while before your confidence in your own recovery begins to feel real and your fears are somewhat relieved. Even with no recurrences, people who have had cancer learn to live with uncertainty.

### Follow-up Care

In no other cancer is follow-up care as important after treatment as in testicular cancer. Your health care team will explain what tests you need and how often they should be done. You will need frequent blood tests to measure levels of certain protein markers (alpha-fetoprotein [AFP], human chorionic gonadotropin [HCG], and lactate dehydrogenase [LDH]) to help detect relapse as early as possible. You will also need frequent x-rays, CT scans, and other imaging studies to detect recurrence, metastasis, or a new tumor. After a few years these appointments and tests will not have to be done as often. Depending on the type of treatment that you have had, you may also need specific follow-up for the possible complications of treatment (see previous information above).

Make a special effort to keep all appointments with your cancer care team and follow their instructions carefully. Report any new or recurring symptoms to your doctor right away. There is about a 3% chance that men who have had cancer in one testicle will develop a cancer in the other. Usually this is a new cancer and is not metastasis from the previous

tumor. There is always an outside chance the cancer can come back, sometimes as long as 30 years later.

Testicular cancer or its treatment can make a man infertile. Before treatment starts, men who wish to father children may want to consider storing sperm in a sperm bank for later use. Be aware, however, that the disease can cause low sperm counts, which may make it hard to obtain a good sample. In some cases, if one testicle remains, fertility returns temporarily or permanently after the testicular cancer has been treated successfully. For example, fertility typically returns 2 years after chemotherapy stops. Even when sperm counts in semen are very low, men have several options for fathering children. One of these options includes in vitro fertilization, in which an egg cell that has been removed from your partner's ovary is returned to her uterus after it has been fertilized by your sperm cells in a laboratory dish. Be sure to discuss any fertility concerns with your doctor before your treatment begins.

Almost any cancer treatment has side effects. Some may last for a few weeks to several months, but others can be permanent. Don't hesitate to tell your cancer care team about any symptoms or side effects that bother you so they can help you manage them.

It is also important to keep medical insurance. Even though no one wants to think of their cancer coming back, it is always a possibility. If it happens, the last thing you want is to have to worry about is paying for treatment.

## Seeing a New Doctor

At some point after your cancer diagnosis and treatment, you may find yourself in the office of a new doctor. Your original doctor may have moved or retired, or you may have moved or changed doctors for some reason. It is important that you be able to give your new doctor the exact details of your diagnosis and treatment. Make sure you have the following information handy:

- a copy of your pathology report from any biopsy or surgery
- if you had surgery, a copy of your operative report
- if you were hospitalized, a copy of the discharge summary that every doctor must prepare when patients are sent home from the hospital
- finally, since some drugs can have long-term side effects, a list of your drugs (especially chemotherapy drugs), drug doses, and when you took them

## Lifestyle Changes to Consider During and After Treatment

Having cancer and dealing with treatment can be time-consuming and emotionally draining, but it can also be a time to look at your life in new ways. Maybe you are thinking about how to improve your health over the long term. Some people even begin this process during cancer treatment.

## **Make Healthier Choices**

Think about your life before you learned you had cancer. Were there things you did that might have made you less healthy? Maybe you drank too much alcohol, or ate more than you needed, or smoked, or didn't exercise very often. Emotionally, maybe you kept your feelings bottled up, or maybe you let stressful situations go on too long.

Now is not the time to feel guilty or to blame yourself. However, you can start making changes *today* that can have positive effects for the rest of your life. Not only will you feel better but you will also be healthier. What better time than *now* to take advantage of the motivation you have as a result of going through a life-changing experience like having cancer?

You can start by working on those things that you feel most concerned about. Get help with those that are harder for you. For instance, if you are thinking about quitting smoking and need help, call the American Cancer Society's Quitline<sup>®</sup> tobacco cessation program at 1-800-ACS-2345.

## **Diet and Nutrition**

Eating right can be a challenge for anyone, but it can get even tougher during and after cancer treatment. For instance, treatment often may change your sense of taste. Nausea can be a problem. You may lose your appetite for a while and lose weight when you don't want to. On the other hand, some people gain weight even without eating more. This can be frustrating, too.

If you are losing weight or have taste problems during treatment, do the best you can with eating and remember that these problems usually improve over time. You may want to ask your cancer team for a referral to a dietitian, an expert in nutrition who can give you ideas on how to fight some of the side effects of your treatment. You may also find it helps to eat small portions every 2 to 3 hours until you feel better and can go back to a more normal schedule.

One of the best things you can do after treatment is to put healthy eating habits into place. You will be surprised at the long-term benefits of some simple changes, like increasing the variety of healthy foods you eat. Try to eat 5 or more servings of vegetables and fruits each day. Choose whole grain foods instead of white flour and sugars. Try to limit meats that are high in fat. Cut back on processed meats like hot dogs, bologna, and bacon. Get rid of them altogether if you can. If you drink alcohol, limit yourself to 1 or 2 drinks a day at the most. And don't forget to get some type of regular exercise. The combination of a good diet and regular exercise will help you maintain a healthy weight and keep you feeling more energetic.

## **Rest, Fatigue, Work, and Exercise**

Fatigue is a very common symptom in people being treated for cancer. This is often not an ordinary type of tiredness but a “bone-weary” exhaustion that doesn’t get better with rest. For some, this fatigue lasts a long time after treatment, and can discourage them from physical activity.

However, exercise can actually help you reduce fatigue. Studies have shown that patients who follow an exercise program tailored to their personal needs feel physically and emotionally improved and can cope better.

If you are ill and need to be on bed rest during treatment, it is normal to expect your fitness, endurance, and muscle strength to decline some. Physical therapy can help you maintain strength and range of motion in your muscles, which can help fight fatigue and the sense of depression that sometimes comes with feeling so tired.

Any program of physical activity should fit your own situation. An older person who has never exercised will not be able to take on the same amount of exercise as a 20-year-old who plays tennis 3 times a week. If you haven’t exercised in a few years but can still get around, you may want to think about taking short walks.

Talk with your health care team before starting, and get their opinion about your exercise plans. Then, try to get an exercise buddy so that you’re not doing it alone. Having family or friends involved when starting a new exercise program can give you that extra boost of support to keep you going when the push just isn’t there.

If you are very tired, though, you will need to balance activity with rest. It is okay to rest when you need to. It is really hard for some people to allow themselves to do that when they are used to working all day or taking care of a household. (For more information about fatigue, please see the publication, "Cancer Related Fatigue and Anemia Treatment Guidelines for Patients.")

Exercise can improve your physical and emotional health.

- It improves your cardiovascular (heart and circulation) fitness.
- It strengthens your muscles.
- It reduces fatigue.
- It lowers anxiety and depression.
- It makes you feel generally happier.
- It helps you feel better about yourself.

And long term, we know that exercise plays a role in preventing some cancers. The American Cancer Society, in its guidelines on physical activity for cancer prevention, recommends that adults take part in at least 1 physical activity for 30 minutes or more on 5

days or more of the week. Children and teens are encouraged to try for at least 60 minutes a day of energetic physical activity on at least 5 days a week.

## **How About Your Emotional Health?**

Once your treatment ends, you may find yourself overwhelmed by emotions. This happens to a lot of people. You may have been going through so much during treatment that you could only focus on getting through your treatment.

Now you may find that you think about the potential of your own death, or the effect of your cancer on your family, friends, and career. You may also begin to re-evaluate your relationship with your spouse or partner. Unexpected issues may also cause concern -- for instance, as you become healthier and have fewer doctor visits, you will see your health care team less often. That can be a source of anxiety for some.

This is an ideal time to seek out emotional and social support. You need people you can turn to for strength and comfort. Support can come in many forms: family, friends, cancer support groups, church or spiritual groups, online support communities, or individual counselors.

Almost everyone who has been through cancer can benefit from getting some type of support. What's best for you depends on your situation and personality. Some people feel safe in peer-support groups or education groups. Others would rather talk in an informal setting, such as church. Others may feel more at ease talking one-on-one with a trusted friend or counselor. Whatever your source of strength or comfort, make sure you have a place to go with your concerns.

The cancer journey can feel very lonely. It is not necessary or realistic to go it all by yourself. And your friends and family may feel shut out if you decide not to include them. Let them in -- and let in anyone else who you feel may help. If you aren't sure who can help, call your American Cancer Society at 1-800-ACS-2345 and we can put you in touch with an appropriate group or resource.

You can't change the fact that you have had cancer. What you can change is how you live the rest of your life -- making healthy choices and feeling as well as possible, physically and emotionally.

## **What Happens if Treatment Is No Longer Working?**

If cancer continues to grow after one kind of treatment, or if it returns, it is often possible to try another treatment plan that might still cure the cancer, or at least shrink the tumors enough to help you live longer and feel better. On the other hand, when a person has received several different medical treatments and the cancer has not been cured, over time the cancer tends to become resistant to all treatment. At this time it's important to weigh the possible



limited benefit of a new treatment against the possible downsides, including continued doctor visits and treatment side effects.

Everyone has his or her own way of looking at this. Some people may want to focus on remaining comfortable during their limited time left.

This is likely to be the most difficult time in your battle with cancer -- when you have tried everything medically within reason and it's just not working anymore. Although your doctor may offer you new treatment, you need to consider that at some point, continuing treatment is not likely to improve your health or change your prognosis or survival.

If you want to continue treatment to fight your cancer as long as you can, you still need to consider the odds of more treatment having any benefit. In many cases, your doctor can estimate the response rate for the treatment you are considering. Some people are tempted to try more chemotherapy or radiation, for example, even when their doctors say that the odds of benefit are less than 1%. In this situation, you need to think about and understand your reasons for choosing this plan.

No matter what you decide to do, it is important that you be as comfortable as possible. Make sure you are asking for and getting treatment for any symptoms you might have, such as pain. This type of treatment is called "palliative" treatment.

Palliative treatment helps relieve these symptoms, but is not expected to cure the disease; its main purpose is to improve your quality of life. Sometimes, the treatments you get to control your symptoms are similar to the treatments used to treat cancer. For example, radiation therapy might be given to help relieve bone pain from bone metastasis. Or chemotherapy might be given to help shrink a tumor and keep it from causing a bowel obstruction. But this is not the same as receiving treatment to try to cure the cancer.

At some point, you may benefit from hospice care. Most of the time, this is given at home. Your cancer may be causing symptoms or problems that need attention, and hospice focuses on your comfort. You should know that receiving hospice care doesn't mean you can't have treatment for the problems caused by your cancer or other health conditions. It just means that the focus of your care is on living life as fully as possible and feeling as well as you can at this difficult stage of your cancer.

Remember also that maintaining hope is important. Your hope for a cure may not be as bright, but there is still hope for good times with family and friends -- times that are filled with happiness and meaning. In a way, pausing at this time in your cancer treatment is an opportunity to refocus on the most important things in your life. This is the time to do some things you've always wanted to do and to stop doing the things you no longer want to do.

## **What's New in Testicular Cancer Research and Treatment?**

Important research into testicular cancer is being done in many university hospitals, medical centers, and other institutions around the country. Each year, scientists find out more about what causes the disease, how to prevent it, and how to improve treatment.

Scientists are studying the changes in DNA of testicular cancer cells to learn more about the causes of this disease. Their hope is that improved understanding will lead to even more effective treatment. Also, a better understanding of the genetic changes will help doctors decide which patients need further treatment and which can be safely treated with surgery alone.

Clinical trials have refined doctors' approaches to treating these cancers and are expected to answer additional questions. For example, studies have identified factors to help predict which patients have a particularly good prognosis and may not need lymph node surgery or radiation therapy. Studies also have found unfavorable prognostic factors that suggest certain patients may benefit from more intensive treatment.

New drugs and new drug combinations are being tested for patients with recurrent cancer. Stem cell transplantation is being studied as a strategy for helping men who have tumors with a poor prognosis tolerate more intensive chemotherapy. And chemotherapy combinations are being refined to see if eliminating certain drugs, replacing them with others, or lowering doses can reduce side effects for some men without reducing the effectiveness of treatment.

Recent studies have found that men who are HIV-positive have an increased risk of developing testicular cancer. Because of modern drug therapy of the HIV infection, most of these men can be cured using standard treatment (orchiectomy, chemotherapy, and/or radiation therapy) and can have an improved quality of life despite their HIV status.

As more and more young men are surviving testicular cancer, fertility has become an increasingly important consideration. Advances in assisted reproduction methods such as in vitro fertilization have made fatherhood possible for testicular cancer survivors, even if their sperm counts are extremely low. In some cases, sperm cells removed from a testicular biopsy specimen can be successful when other options have failed.

## **Additional Resources**

### **More Information From Your American Cancer Society**

We have selected some related information that may also be helpful to you. These materials may be ordered from our toll-free number, 1-800-ACS-2345.

After Diagnosis: A Guide for Patients and Families (also available in Spanish)

Sexuality and Cancer: For the Man Who Has Cancer and His Partner (also available in Spanish)

Understanding Chemotherapy: A Guide for Patients and Families (also available in Spanish)

Understanding Radiation Therapy: A Guide for Patients and Families (also available in Spanish)

The following books are available from the American Cancer Society. Call us at 1-800-ACS-2345 to ask about costs or place your order.

*Cancer in the Family: Helping Children Cope with a Parent's Illness*

*Couples Confronting Cancer: Keeping Your Relationship Strong*

## **National Organizations and Web Sites\***

In addition to the American Cancer Society, other sources of patient information and support include:

National Cancer Institute  
Telephone: 1-800-4-CANCER  
Internet Address: [www.cancer.gov](http://www.cancer.gov)

The Testicular Cancer Resource Center  
Internet Address: <http://tcrc.acor.org>

\*Inclusion on this list does not imply endorsement by the American Cancer Society.

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at 1-800-ACS-2345 or visit [www.cancer.org](http://www.cancer.org).

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