



Bladder Cancer

What is cancer?

The body is made up of hundreds of millions of living cells. Normal body cells grow, divide, and die in an orderly fashion. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out or dying cells or to repair injuries.

Cancer begins when cells in a part of the body start to grow out of control. There are many kinds of cancer, but they all start because of out-of-control growth of abnormal cells.

Cancer cell growth is different from normal cell growth. Instead of dying, cancer cells continue to grow and form new, abnormal cells. Cancer cells can also invade (grow into) other tissues, something that normal cells cannot do. Growing out of control and invading other tissues are what makes a cell a cancer cell.

Cells become cancer cells because of damage to DNA. DNA is in every cell and directs all its actions. In a normal cell, when DNA gets damaged the cell either repairs the damage or the cell dies. In cancer cells, the damaged DNA is not repaired, but the cell doesn't die like it should. Instead, this cell goes on making new cells that the body does not need. These new cells will all have the same damaged DNA as the first cell does.

People can inherit damaged DNA, but most DNA damage is caused by mistakes that happen while the normal cell is reproducing or by something in our environment. Sometimes the cause of the DNA damage is something obvious, like cigarette smoking. But often no clear cause is found.

In most cases the cancer cells form a tumor. Some cancers, like leukemia, rarely form tumors. Instead, these cancer cells involve the blood and blood-forming organs and circulate through other tissues where they grow.

Cancer cells often travel to other parts of the body, where they begin to grow and form new tumors that replace normal tissue. This process is called metastasis. It happens when the cancer cells get into the bloodstream or lymph vessels of our body.

No matter where a cancer may spread, it is always named for the place where it started. For example, breast cancer that has spread to the liver is still called breast cancer, not liver cancer. Likewise, prostate cancer that has spread to the bone is metastatic prostate cancer, not bone cancer.

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.

Not all tumors are cancerous. Tumors that aren't cancer are called benign. Benign tumors can cause problems – they can grow very large and press on healthy organs and tissues. But they cannot grow into (invade) other tissues. Because they can't invade, they also can't spread to other parts of the body (metastasize). These tumors are almost never life threatening.

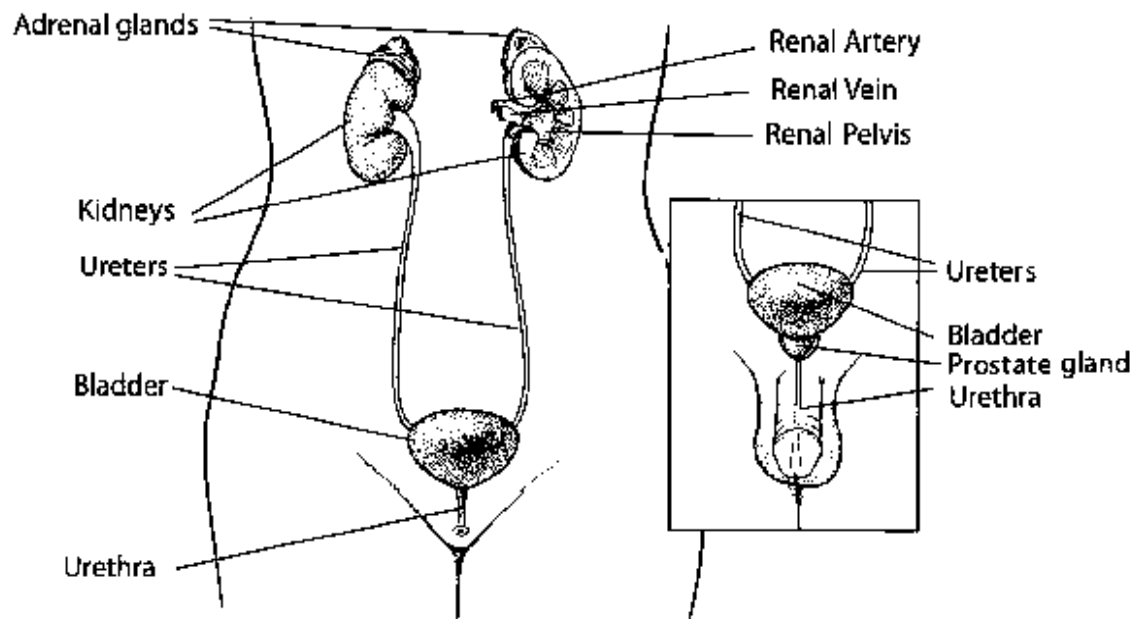
What is bladder cancer?

To understand bladder cancer, it helps to know about the normal structure and function of the bladder.

The normal bladder

The bladder is a hollow organ in the pelvis with flexible, muscular walls. Its main function is to store urine before it leaves the body. The average adult bladder holds about 2 cups of urine. Urine is made by the kidneys and is then carried to the bladder through tubes called *ureters*.

During urination, the muscles in the bladder contract, and urine is forced out of the bladder through a tube called the *urethra*. In women, the urethra is a very short tube that opens just above the vagina. In men, the urethra is longer. It passes through the prostate gland and the penis, and opens at the tip of the penis.



The wall of the bladder has several layers. A layer of cells lines the inside of the ureter, bladder, and urethra, and parts of the kidney. These cells are called *urothelial* or *transitional* cells, so this inner layer is called the *urothelium* or *transitional epithelium*. Beneath the urothelium is a thin layer of connective tissue called the *lamina propria*. Next is a layer of muscle tissue called the *muscularis propria*. Beyond this muscle, another zone of fatty connective tissue separates the bladder from other nearby organs.

These layers are very important in understanding bladder cancer. Most bladder cancers start in the urothelium. As the cancer penetrates or grows through the other layers in the bladder, it becomes harder to treat.

Types of bladder cancer

Bladder tumors are grouped into several types by how their cells look under a microscope. The type of bladder cancer you have can affect your treatment options. This is because different types can respond differently to treatments such as radiation and chemotherapy.

The main types of cancers that affect the bladder are:

- Transitional cell carcinoma (also called urothelial carcinoma)
- Squamous cell carcinoma
- Adenocarcinoma

- Small cell carcinoma

These same types of cancer can also grow in other places in the urinary tract, such as the lining of the kidney (called the *renal pelvis*), the ureters, and the urethra. In fact, patients with bladder cancer sometimes have a similar tumor in the lining of the kidneys, ureters, or urethra. Therefore, when someone is found to have a cancer in one part of their urinary system, the entire urinary tract needs to be checked for tumors.

Transitional cell (urothelial) carcinoma

This is the most common type of bladder cancer. About 95% of bladder cancers are this type. The cells from transitional cell carcinomas look like the urothelial cells that line the inside of the bladder.

Two very important traits in predicting the outlook for transitional cell carcinomas are the grade of the cancer and whether or not it is invasive.

Grade: These tumors are divided into grades based on how abnormal the cells look under the microscope. If the cells look more like normal cells, the cancer is called a low-grade cancer. When the cells look more abnormal, the cancer is high-grade. Lower-grade cancers tend to grow more slowly and have a better outcome than higher-grade cancers.

Invasiveness: If the cancer stays in the inner layer of cells without growing into the deeper layers, it is called *non-invasive*. If the cancer grows into the lamina propria or even deeper into the muscle layer, it is called *invasive*. Invasive cancers are more likely to spread and are harder to treat. You may also see a bladder cancer described as *superficial* or *non-muscle invasive*. These terms include both non-invasive tumors as well as any invasive tumors that have not grown into the main muscle layer of the bladder.

Transitional cell carcinomas are also divided into 2 subtypes, papillary and flat.

Papillary carcinomas grow in slender, finger-like projections from the inner surface of the bladder toward the hollow center. Papillary tumors often grow toward the center of the bladder without growing into the deeper bladder layers. These tumors are called *non-invasive papillary cancers*. Very low-grade non-invasive papillary cancer is sometimes called *papillary neoplasm of low-malignant potential* and tends to have a very good outcome.

Flat carcinomas do not grow toward the hollow part of the bladder at all. If a flat tumor is only in the inner layer of bladder cells, it is known as a *non-invasive flat carcinoma* or a *flat carcinoma in situ (CIS)*.

If either a papillary or flat tumor grows into deeper layers of the bladder, it is called an *invasive transitional cell (or urothelial) carcinoma*.

Squamous cell carcinoma

In the United States, only about 1% to 2% of bladder cancers are squamous cell carcinomas. Under a microscope, the cells look much like the flat cells that are found on the surface of the skin. Nearly all squamous cell carcinomas are invasive.

Adenocarcinoma

Only about 1% of bladder cancers are adenocarcinomas. The cancer cells have a lot in common with gland-forming cells of colon cancers. Nearly all adenocarcinomas of the bladder are invasive.

Small-cell carcinoma

Less than 1% of bladder cancers are small-cell carcinomas, which start in nerve-like cells called neuroendocrine cells. These cancers typically need to be treated with chemotherapy similar to that used for small-cell carcinoma of the lung.

Other cancers

Cancers rarely start in the muscle cells of the bladder. But when they do, these cancers are called *sarcomas*. More information about sarcomas can be found in our documents: *Sarcoma - Adult Soft Tissue Cancer* and *Rhabdomyosarcoma*.

What are the key statistics about bladder cancer?

The American Cancer Society's most recent estimates for bladder cancer in the United States are for 2012:

- About 73,510 new cases of bladder cancer diagnosed (about 55,600 in men and 17,910 in women).
- About 14,880 deaths from bladder cancer (about 10,510 in men and 4,370 in women).

The rates of new cancers and of cancer deaths have been fairly stable over the past 20 years. More than 500,000 people in the United States are survivors of this cancer.

Bladder cancer occurs mainly in older people. About 9 out of 10 people with this cancer are over the age of 55. The average age at the time of diagnosis is 73.

Men are about 3 times more likely to get bladder cancer during their lifetime than women. Overall, the chance men will develop this cancer during their life is about 1 in 26. For women, the chance is about 1 in 86. (The risk for a particular person may be higher or lower, based on risk factors such as whether or not they smoke.) Bladder cancer is the fourth most common cancer diagnosed in men.

Whites are diagnosed with bladder cancer almost twice as often as blacks. Hispanics have an even lower rate than blacks.

In about half of all cases, patients are first diagnosed with bladder cancer while it is still confined to the inner layer of the bladder (non-invasive or in situ cancer). About 35% have bladder cancer that has invaded into deeper layers but is still contained in the bladder. In most of the remaining cases, the cancer has spread to nearby tissues outside

the bladder. Rarely (in about 4% of cases), it has spread to distant sites. Black patients are slightly more likely to have more advanced disease when they are diagnosed, compared to whites.

Survival rates for bladder cancer are discussed in the section, "Survival rates by stage."

What are the risk factors for bladder 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 the skin to too much sun is a risk factor for skin cancer. Smoking is a risk factor for many cancers, including lung and bladder cancer.

But risk factors don't tell us everything. Having a risk factor, or even several, does not mean that you will get the disease. Many people with risk factors never develop bladder cancer, while others with this disease may have few or no known risk factors.

Still, it is important to know about some of the risk factors for bladder cancer because there may be things you can do that might lower your risk of getting it. If you are at higher risk because of certain factors, you may benefit from tests that might help find it early, when treatment is most likely to be effective.

There are several risk factors that make a person more likely to develop bladder cancer.

Smoking

Smoking is the most important risk factor for bladder cancer. Smokers are more than twice as likely to get bladder cancer as nonsmokers. Smoking causes about half of the deaths from bladder cancer among men and almost a third of bladder cancer deaths in women.

When smokers inhale, some of the carcinogens (cancer-causing chemicals) in tobacco smoke are absorbed from the lungs and get into the blood. From the blood, they are filtered by the kidneys and concentrated in the urine. These chemicals in urine can damage the cells that line the inside of the bladder, which increases the chance of cancer developing.

Workplace exposures

Certain industrial chemicals have been linked with bladder cancer. Chemicals called aromatic amines, such as benzidine and beta-naphthylamine, which are sometimes used in the dye industry, can cause bladder cancer.

Other industries that use certain organic chemicals also may put workers at risk for bladder cancer if exposure is not limited by good workplace safety practices. The industries carrying highest risks include the makers of rubber, leather, textiles, and paint products as well as printing companies. Other workers with an increased risk of developing bladder cancer include painters, machinists, printers, hairdressers (likely

because of heavy exposure to hair dyes), and truck drivers (likely because of exposure to diesel fumes).

Cigarette smoking and workplace exposures may act together to cause bladder cancer. Smokers who work with the cancer-causing chemicals noted above have an especially high risk of developing bladder cancer.

Race and ethnicity

Whites are about twice as likely to develop bladder cancer as African Americans. Hispanics, Asian Americans, and American Indians have lower rates of bladder cancer. The reasons for these differences are not well understood.

Age

The risk of bladder cancer increases with age. About 9 out of 10 people with bladder cancer are over the age of 55.

Gender

Bladder cancer is much more common in men than in women.

Chronic bladder irritation and infections

Urinary infections, kidney and bladder stones, and other causes of chronic bladder irritation have been linked with bladder cancer (especially squamous cell carcinoma of the bladder), but they do not necessarily cause bladder cancer.

Schistosomiasis (also known as bilharziasis), an infection with a parasitic worm called *Schistosoma hematobium* that can get into the bladder, is also a risk factor for bladder cancer. In countries where this parasite is common (mainly in Africa and the Middle East), squamous cell cancers of the bladder are seen much more often. This parasite is an extremely rare cause of bladder cancer in the United States.

Personal history of bladder cancer

Urothelial carcinomas can form in many areas in the bladder as well as in the lining of the kidney, the ureters, and urethra. Having a cancer in any part of the urinary tract lining puts you at higher risk of having another tumor. The tumor can form in the same area as before, or in another part of the urothelium (lining). This is true even when the first tumor is completely removed. For this reason, people who have had bladder cancer need close, routine medical follow-up.

Bladder birth defects

Before birth, there is a connection between the belly button and the bladder. This connection, called the *urachus*, normally disappears before birth. If part of this

connection remains after birth, it could become cancerous. Cancers that start in the urachus are usually *adenocarcinomas*, which are made up of malignant gland cells. Cancer starting in this way represents about one third of the adenocarcinomas of the bladder. However, this is still rare, accounting for less than a half of 1% of all bladder cancers.

Another rare birth defect called *exstrophy* greatly increases a person's risk of developing bladder cancer. In bladder exstrophy, both the bladder and the abdominal wall in front of the bladder fail to close completely during development and are fused together. This leaves the inner lining of the bladder exposed outside the body. Surgery soon after birth can close the bladder and abdominal wall (and repair other related defects), but patients who have this are still at increased risk for urinary infections and bladder cancer.

Genetics and family history

People who have family members with bladder cancer have an increased risk of getting it themselves. In some cases, these family members may all be exposed to the same cancer-causing chemical. They may also share changes in some genes (like *GST* and *NAT*) that cause their bodies to be slow to break down certain toxins, which may make them more likely to develop bladder cancer.

A small number of people inherit a gene syndrome that increases their risk for bladder cancer. For example:

- A mutation of the retinoblastoma (*Rb1*) gene can cause cancer of the eye in infants, and also increases the risk of bladder cancer.
- Cowden disease, caused by mutations in a gene called *PTEN*, is linked mainly to cancers of the breast and thyroid. People with this disease also have a higher risk of bladder cancer.
- Hereditary non-polyposis colorectal cancer (HNPCC) syndrome (also known as Lynch syndrome) is mainly linked to colon and endometrial cancer. People with this syndrome also have an increased risk of bladder cancer, as well as cancer of the ureters.

Chemotherapy and radiation therapy

Long-term use of the chemotherapy drug cyclophosphamide (Cytosan) can irritate the bladder and increase the risk of bladder cancer. People taking this drug are often told to drink plenty of fluids to help protect the bladder from irritation and decrease the risk of bladder cancer.

People who are treated with radiation to the pelvis are more likely to develop bladder cancer.

Arsenic

Arsenic in drinking water has been linked with an increased risk of bladder cancer. The chance of being exposed to arsenic depends on where you live and whether you get your water from a well or from a system that meets the standards for arsenic content.

Low fluid consumption

Not drinking enough fluids may increase the risk of bladder cancer. People who drink a lot of fluids each day have a lower rate of bladder cancer. This is thought to be because they empty their bladders often. By doing this, they keep chemicals from lingering in their bodies.

Do we know what causes bladder cancer?

We still do not know exactly what causes most bladder cancers. But researchers have found some risk factors (see the section, "What are the risk factors for bladder cancer?") and are beginning to understand how these factors cause cells in the bladder to become cancerous. /ssLINK/bladder-cancer-risk-factors

During the past few years, scientists have made a lot of progress in understanding how certain changes in DNA can cause normal bladder cells to grow abnormally and form cancers. DNA is the chemical in each of our cells that makes up our *genes* – the instructions for how our cells function. We usually look like our parents because they are the source of our DNA. However, DNA affects more than how we look.

Some genes have instructions for controlling when cells grow and divide. Genes that promote cell division are called *oncogenes*. Genes that slow down cell division or cause cells to die at the right time are called *tumor suppressor genes*. Cancers can be caused by DNA changes that turn on oncogenes or turn off tumor suppressor genes. Several different genes usually need to have changes for a cell to become cancerous.

Some people inherit DNA changes from their parents that greatly increase their risk for developing certain cancers. However, bladder cancer does not often run in families, and inherited gene mutations are not thought to be a major cause of this disease.

DNA changes related to bladder cancer usually develop during a person's life rather than having been inherited before birth. These *acquired* DNA mutations may result from exposure to cancer-causing chemicals. For example, chemicals in tobacco smoke can be absorbed into the blood, filtered by the kidneys, and end up in the urine, where they may affect bladder cells. Other chemicals may reach the bladder in a similar way. But in some cases, gene changes may just be random events that sometimes happen inside a cell, without having an external cause.

There does not seem to be a single pathway to bladder cancer that is the same in all cases. Acquired changes in certain genes, such as the *p53* or *Rb1* tumor suppressor genes and the *FGFR* oncogene, are thought to be important in the development of some bladder cancers. Changes of these and similar genes may also make some bladder cancers more

likely to grow and invade more rapidly than others. Current research in this field is aimed at developing tests that can find bladder cancers at an early stage by recognizing their DNA changes.

Bladder cancers do not often result from inherited mutations in oncogenes or tumor suppressor genes, but some people seem to inherit a reduced ability to detoxify (break down) certain types of cancer-causing chemicals. These people are more sensitive to the cancer-causing effects of tobacco smoke and certain industrial chemicals. Researchers are developing tests that may help identify such people, but these tests are not routinely done. It is not certain how these test results would be used since doctors recommend that all people avoid tobacco smoke and hazardous industrial chemicals.

Can bladder cancer be prevented?

There is no sure way to prevent bladder cancer, but there may be things you can do that could lower your risk.

Do not smoke

Smoking is believed to cause nearly half the deaths from bladder cancer among men and nearly a third among women.

Limit exposure to certain chemicals in the workplace

If you work with a class of chemicals called aromatic amines, be sure to follow good work safety practices. Industries where these chemicals are commonly used include the makers of rubber, leather, printing materials, textiles, and paint products.

Aromatic amines are also found in many hair dyes, so it is important for hairdressers and barbers who are exposed to these products regularly to use them safely. (Most studies have not found that personal use of hair dyes increases bladder cancer risk.)

Drink plenty of liquids

There is some evidence that drinking a lot of fluids – mainly water – may lower a person's risk of bladder cancer.

Eat a lot of fruits and vegetables

A diet high in fruits and vegetables may help protect against bladder cancer.

Can bladder cancer be found early?

Bladder cancer can sometimes be found early. Finding it early improves your chances that it can be treated successfully.

Screening

Screening tests or exams are used to look for a disease in people who have no symptoms (and who have not had that disease before). Screening the general public for bladder cancer is not recommended by any professional organization at this time. This is because no screening test has been shown to lower the risk of dying from bladder cancer in people who are at average risk.

However, some doctors may recommend bladder cancer screening for people at very high risk. This includes people with a previous diagnosis of bladder cancer or certain birth defects of the bladder. People with a lot of work-related exposure to certain chemicals might also be screened.

Screening tests

Urinalysis: One way to test for bladder cancer is to check for blood in the urine (called *hematuria*). Blood in the urine is usually caused by benign (non-cancerous) conditions such as infections, but it can be the first sign of bladder cancer. Large amounts of blood in the urine can easily be seen, but a urinalysis test is needed to find small amounts.

Most studies of routine urinalysis as a screening test to look for blood haven't found more bladder cancers, but one study found that screening might detect the cancer at an earlier stage.

Urine cytology: This test looks for bladder cancer by examining the urine under a microscope for cancer cells. Urine cytology does find some cancers, but it is not reliable enough to make a good screening test.

Urine tests for tumor markers: Several newer tests look for substances in the urine that might indicate bladder cancer:

- UroVysion™: This test looks for chromosome changes that are often seen in bladder cancer cells.
- BTA tests: These tests look for a substance called bladder tumor-associated antigen (BTA) in the urine.
- Immunocyt™: This test looks at cells in the urine for the presence of substances such as mucin and carcinoembryonic antigen (CEA), which are often found on cancer cells.
- NMP22 BladderChek®: This test looks for a protein called NMP22 in the urine, which is often found at higher levels in people who have bladder cancer.

These tests may be able to find some bladder cancers early, but they may miss some cancers as well. In other cases, the test result may be abnormal even in some people who do not have cancer. At this time they are used mainly to look for bladder cancer in people who already have signs or symptoms of cancer, or in patients who have had a bladder cancer removed to check for cancer recurrence. Further research is needed before they are proven useful as screening tests.

Most experts feel that more studies need to be done before any test becomes useful for widespread screening for bladder cancer.

Watching for possible symptoms of bladder cancer

While no screening tests are recommended for people at average risk, bladder cancer can often be found early because it causes blood in the urine or other urinary symptoms (see "How is bladder cancer diagnosed?"). The symptoms that can be seen with bladder cancer more often have less serious causes, but it's important to have them checked by a doctor right away so the cause can be found and treated, if needed. If the symptoms are due to bladder cancer, finding it early offers the best chance for successful treatment.

How is bladder cancer diagnosed?

Bladder cancers are usually found because of signs or symptoms a person is having. If bladder cancer is suspected, tests will be needed to confirm the diagnosis.

Signs and symptoms of bladder cancer

Blood in the urine

In most cases, blood in the urine (hematuria) is the first warning sign of bladder cancer. Sometimes, there is enough blood to change the color of the urine. Depending on the amount of blood, the urine may be very pale yellow-red or, less often, darker red. In other cases, the color of the urine is normal but small amounts of blood can be found by urine tests done because of other symptoms or as part of a general medical checkup.

Blood may be present one day and absent the next, with the urine remaining clear for weeks or months. With bladder cancer, blood eventually reappears. Usually, the early stages of bladder cancer cause bleeding but little or no pain.

Blood in the urine does not mean you have bladder cancer. Much more often it is caused by other things like an infection, benign (non-cancerous) tumors, stones in the kidney or bladder, or other benign kidney diseases. But it is important to have it checked by a doctor so that the cause can be found.

Changes in bladder habits or irritative symptoms

Bladder cancer can sometimes cause changes in urination, such as:

- Frequency: having to urinate more often than usual
- Dysuria: feeling pain or burning during urination
- Urgency: feeling as if you need to go right away, even when the bladder is not full

These symptoms are also more likely to be caused by a benign condition such as infection, benign tumors, bladder stones, an overactive bladder, or an enlarged prostate (in men). Still, it is important to have them checked by a doctor so that the cause can be found and treated, if needed.

Bladder cancers that have grown large enough may cause additional symptoms, such as lower back pain or being unable to urinate.

If there is a reason to suspect you might have bladder cancer, the doctor will use one or more methods to find out if it is cancer or something else. If it is cancer, further tests will be done to help determine the extent (stage) of the disease.

Medical history and physical exam

The first step is for your doctor to take a complete medical history to check for risk factors and symptoms. A physical exam provides other information about signs of bladder cancer and other health problems. The doctor might examine the rectum and vagina (in women) to determine the size of a bladder tumor and to see if and how far it has spread.

If the results of the exam are abnormal, your doctor will likely refer you to a urologist (a doctor specializing in diseases of the urinary system and male reproductive system) for further tests and treatment.

Cystoscopy

If bladder cancer is suspected, doctors will recommend a cystoscopy. For this procedure, a urologist places a cystoscope – a slender tube with a light and a lens or a small video camera on the end – through the opening of the urethra and advances it into the bladder. Sterile salt water is then injected through the scope to expand the bladder and allow the doctor to look at the bladder lining.

Cystoscopy can be done in a doctor's office or in the operating room. Usually the first cystoscopy will be done in the doctor's office using a small, flexible fiber-optic device. Some sort of local anesthesia may be used to numb the urethra and bladder for the procedure. If a general or spinal anesthesia is used, the procedure is done in the operating room.

If an abnormal area or a growth is seen, it will be biopsied. A thin instrument is threaded through the cystoscope to remove a small piece of tissue, which is then sent to a lab to be looked at under the microscope. Salt water washings from inside the bladder may also be collected to look for cancer cells. (See below for more about biopsies.)

Fluorescence cystoscopy may be done along with routine cystoscopy. For this procedure, drugs called porphyrins are put into the bladder during cystoscopy. They are taken up by cancer cells. When the doctor then shines a blue light through the cystoscope, any cells containing the porphyrins will glow (fluoresce). This can allow the doctor to see areas with cancer cells that may have been missed by the white light normally used.

Lab tests

Urine cytology

For this test, a sample of urine is looked at under a microscope to see if it contains any cancer or pre-cancer cells. Cytology is also done on any bladder washings taken when the cystoscopy was done. Cytology can help find some cancers, but this test is not perfect. Not finding cancer on this test doesn't always mean you are cancer free.

Urine culture

If you are having urinary symptoms, this test may be done to see if an infection (rather than cancer) is the cause. Infections and bladder cancers can cause similar symptoms. For a urine culture, a sample of urine is put into a dish in the lab to allow any bacteria that are present to grow. Because it can take time for the bacteria to grow, it may take a few days to get the results of this test.

Urine tumor marker tests

A number of different urine tests look for specific substances released by bladder cancer cells. These tests may be used along with urine cytology to help determine if a person has bladder cancer. They include the tests for NMP22 and BTA, the Immunocyt test, and the UroVysion test (discussed in the section, "Can bladder cancer be found early?").

Some doctors find these urine tests useful in looking for bladder cancers, but they may not help in all cases. Most doctors feel that cystoscopy is still the best way to find bladder cancer. Some of these tests may be more helpful when looking for possible recurrence of bladder cancer in someone who has already had it, rather than finding it in the first place.

Biopsy

A biopsy is the removal of a sample of tissue to see if it is cancer. The tissue that is removed is sent to the lab so that a pathologist can look at it under the microscope. A pathologist is a doctor who specializes in diagnosing diseases by examining tissues with a microscope. If bladder cancer is suspected, a biopsy is needed to confirm the diagnosis.

Bladder biopsies

Bladder biopsy samples are most often obtained during cystoscopy. This allows the doctor to be precise in terms what tissue is removed. A biopsy can show whether cancer is present and what type of bladder cancer it is. If bladder cancer is found, two important features are its invasiveness and grade.

Invasiveness: The biopsy can show how deeply the cancer has invaded into the bladder wall, which is very important in deciding treatment. If the cancer stays in the inner layer of cells without growing into the deeper layers, it is called *non-invasive*. If the cancer

grows into the deeper layers of the bladder, it is called *invasive*. Invasive cancers are more likely to spread and are harder to treat.

You may also see a bladder cancer described as *superficial* or *non-muscle invasive*. These terms include both non-invasive tumors as well as any invasive tumors that have not grown into the main muscle layer of the bladder.

Grade: Bladder cancers are also assigned a grade, based on how they look under the microscope.

- Low-grade cancers look more like normal bladder tissue. They are also called well-differentiated cancers. These cancers usually have a good prognosis (outlook).
- High-grade cancers look less like normal tissue. These cancers may be called either poorly differentiated or undifferentiated. High-grade cancers are more likely to grow into the bladder wall and to spread outside the bladder. These cancers can be harder to treat.

People with one bladder cancer may develop more cancers in other areas of the bladder or in the urinary system. For this reason, the doctor may take tissue samples from several different areas of the bladder lining.

Biopsies to look for cancer spread

If imaging tests (see the next section) suggest the cancer may have spread outside of the bladder, a biopsy is the only way to be sure. In some cases, biopsy samples of suspicious areas are obtained during the surgery to remove the bladder cancer.

Another way to get a biopsy sample is to use a thin, hollow needle to take a small piece of tissue from the abnormal area. This is known as a needle biopsy, and it can allow the doctor to take samples without an operation. Needle biopsies are sometimes done using a CT scan or ultrasound to help guide the biopsy needle into the abnormal area.

Imaging tests

Imaging tests use x-rays, magnetic fields, sound waves, or radioactive substances to create pictures of the inside of your body. If you have bladder cancer, your doctor may order some of these tests to see if the cancer has spread to tissues near the bladder, nearby lymph nodes, or to distant organs. If an imaging test shows enlarged lymph nodes or other possible signs of cancer spread, some type of biopsy will be needed to confirm the findings.

Intravenous pyelogram

An intravenous pyelogram (IVP), also called an intravenous urogram (IVU), is an x-ray of the urinary system taken after injecting a special dye into a vein. This dye is removed from the bloodstream by the kidneys and then passes into the ureters and bladder. This more clearly outlines these organs on x-rays and helps find urinary tract tumors. Some

people may have allergic reactions to the dye, so it's important to tell your doctor if you have any allergies or have ever had any reactions to x-ray dyes.

Retrograde pyelogram

For this procedure, a thin tube (catheter) is placed through the urethra and up into the bladder or into a ureter. Then a dye is injected through the catheter to make the lining of the bladder, ureters, and kidneys easier to see on x-rays. This test isn't used as often as IVP, but it may be done (along with ultrasound of the kidneys) to look for tumors in the urinary tract in people who can't have an IVP because they are allergic to x-ray dyes.

Chest x-ray

A chest x-ray may be done to look for tumors in the lungs that might be the spread from a bladder cancer.

Computed tomography (CT) scan

The CT scan is an x-ray test that produces detailed cross-sectional images of your body. Instead of taking one picture, like a standard x-ray, a CT scanner takes many pictures as it rotates around you. A computer then combines these pictures into an image of a slice of your body (think of a loaf of sliced bread).

Before any pictures are taken, you may be asked to drink 1 to 2 pints of a liquid called *oral contrast*. This helps outline the intestine so that certain areas are not mistaken for tumors. You may also receive an IV line through which a different kind of contrast dye (IV contrast) is injected. This helps better outline structures such as blood vessels in your body.

The injection can cause some flushing (redness and warm feeling). A few people are allergic to the dye and get hives or, rarely, have more serious reactions like trouble breathing and low blood pressure. Be sure to tell the doctor if you have any allergies or have ever had a reaction to any contrast material used for x-rays.

CT scans take longer than regular x-rays. You will need to lie still on a table while they are being done. During the test, the table slides in and out of the scanner, a ring-shaped machine that completely surrounds the table. You might feel a bit confined by the ring you have to lie in while the pictures are being taken. *Spiral CT* (also known as helical CT) is now used in many medical centers. This type of CT scan uses a faster machine that reduces the dose of radiation and yields more detailed pictures.

A CT scan of the kidney, ureters, and bladder is known as a *CT urogram*. It can provide detailed information about the size, shape, and position of any tumors in the urinary tract. In some cases it may be used instead of an IVP to look at the upper part of the urinary system. It can also help find enlarged lymph nodes that might contain cancer, as well as providing information about other organs in the abdomen and pelvis.

CT-guided needle biopsy: CT scans can also be used to guide a biopsy needle precisely into a suspected tumor. This is not used to biopsy tumors within the bladder, but is most often used to take tissue samples from areas where the cancer may have spread. For this procedure, the patient remains on the CT scanning table while a radiologist advances a biopsy needle through the skin and toward the tumor. CT scans are repeated until the needle is within the mass. A fine needle biopsy sample or a larger core needle biopsy sample is then removed to be looked at under a microscope.

Magnetic resonance imaging (MRI) scan

Like CT scans, MRI scans provide detailed images of soft tissues in the body. But 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 body tissue and by certain diseases. A computer translates the pattern into very detailed images of parts of the body. A contrast material called *gadolinium* is often injected into a vein before the scan to see details more clearly

MRI scans may be a little more uncomfortable than CT scans. They often take up to an hour. You may be placed inside a narrow tube, which is confining and can upset people with a fear of enclosed spaces. Newer, more open MRI machines can sometimes be used instead. The MRI machine also makes buzzing and clicking noises that you may find disturbing. Some places will provide earplugs to help block these noises out.

MRI images are particularly useful in finding signs that the cancer has spread outside of the bladder into nearby tissues or lymph nodes. A special MRI of the kidneys, ureters, and bladder, known as an *MRI urogram*, can be used instead of an IVP to look at the upper part of the urinary system.

Ultrasound

Ultrasound (ultrasonography) uses sound waves to create pictures of internal organs. It can be useful in determining the size of a bladder cancer and whether it has spread beyond the bladder to nearby organs or tissues. It can also be used to look at the kidneys.

This is an easy test to have. It uses no radiation, which is why it is often used to look at developing fetuses. For the exam, you simply lie on a table while a transducer (which is shaped like a wand) is placed on the skin over the part of your body being looked at. Usually, the skin is first lubricated with gel. The transducer gives off sound waves and picks up the echoes as they bounce off organs in the body. The echoes are converted by a computer into a black-and-white image.

Ultrasound-guided needle biopsy: Ultrasound can also be used to guide a biopsy needle into a suspected area of cancer spread in the abdomen or pelvis.

Bone scan

A bone scan can help look for cancer that has spread to bones. Doctors don't usually order this test unless you have symptoms such as bone pain, or if blood tests show the cancer may have spread to the bones.

For this test, a small amount of low-level radioactive material is injected into a vein (intravenously, or IV). The substance settles in areas of damaged bone throughout the entire skeleton over the course of a couple of hours. You then lie on a table for about 30 minutes while a special camera detects the radioactivity and creates a picture of the skeleton.

Areas of active bone changes appear as "hot spots" on the skeleton – that is, they attract the radioactivity. These areas may suggest the presence of cancer, but other bone diseases can also cause the same pattern. To distinguish between these conditions, other imaging tests such as plain x-rays or MRI scans, or even a bone biopsy might be needed.

How is bladder cancer staged?

The stage of a bladder cancer is a standard summary of how far the cancer has spread. It is one of the most important factors in selecting treatment options and estimating a person's outlook for recovery and survival (prognosis). If you have bladder cancer, ask your cancer care team to explain its stage. This can help you make informed choices about your treatment.

There are actually 2 types of stages for bladder cancer.

The **clinical stage** of the cancer is doctor's best estimate of the extent of the cancer, based on the results of physical exams, cystoscopy, biopsies, and any imaging tests that are done (such as CT scans). These exams and tests are described in the section, "How is bladder cancer diagnosed?" Doctors looking at biopsy samples are especially interested in noting whether any cancer cells have spread into the bladder's muscle layers.

If surgery is done, the **pathologic stage** can be determined using the same test results used for the clinical stage, plus what is found during surgery to remove the bladder and nearby lymph nodes.

The clinical stage is used to help plan treatment. Sometimes, though, the cancer has spread further than the clinical stage estimates. Because the pathologic stage is based on what was found at surgery, it can more accurately predict the patient's outlook for survival.

AJCC TNM staging system for bladder cancer

A staging system is a standard way for members of the cancer care team to describe the extent of cancer spread. The staging system most often used for bladder cancer is that of the American Joint Committee on Cancer (AJCC). This is also called the **TNM** system.

The TNM staging system classifies cancers based on 3 key pieces of information:

- The letter **T** is followed by numbers and/or letters to describe how far the main **tumor** has grown through the bladder wall and whether it has grown into nearby tissues. Higher T numbers mean more extensive growth.
- The letter **N** is followed by a number from 0 to 3 to indicate any cancer spread to lymph **nodes** near the bladder. Lymph nodes are bean-sized collections of immune system cells, to which cancers often spread first.
- The letter **M** is followed by 0 or 1 to indicate whether or not the cancer has spread (**metastasized**) to distant sites, such as other organs or lymph nodes that are not near the bladder.

T categories for bladder cancer

The T category describes the main tumor. (See "What is bladder cancer?" for a description of papillary and flat carcinomas and the different layers of the bladder.)

TX: Main tumor cannot be assessed due to lack of information

T0: No evidence of a primary tumor

Ta: Non-invasive papillary carcinoma

Tis: Non-invasive flat carcinoma (flat carcinoma in situ, or CIS)

T1: The tumor has grown from the layer of cells lining the bladder into the connective tissue below. It has not grown into the muscle layer of the bladder.

T2: The tumor has grown into the muscle layer.

- **T2a:** The tumor has grown into the inner half of the muscle layer.
- **T2b:** The tumor has grown into the outer half of the muscle layer.

T3: The tumor has grown through the muscle layer of the bladder and into the fatty tissue that surrounds it.

- **T3a:** The tumor's spread to fatty tissue on the outside of the bladder can only be seen by using a microscope.
- **T3b:** The tumor's spread to fatty tissue on the outside of the bladder is large enough to be seen on imaging tests or to be seen or felt by the surgeon.

T4: The tumor has spread beyond the fatty tissue and into nearby organs or structures. It may be growing into any of the following: the stroma (main tissue) of the prostate, the seminal vesicles, uterus, vagina, pelvic wall, or abdominal wall.

- **T4a:** The tumor has spread to the stroma of the prostate (in men), or to the uterus and/or vagina (in women).
- **T4b:** The tumor has spread to the pelvic wall or the abdominal wall.

Bladder cancer can sometimes affect many areas of the bladder at the same time. If more than one tumor is found, the letter **m** is added to the appropriate T category.

N categories for bladder cancer

The N category describes spread only to the lymph nodes near the bladder (in the true pelvis) and those along the blood vessel called the common iliac artery. These lymph nodes are called *regional lymph nodes*. Any other lymph nodes are considered distant lymph nodes. Spread to distant nodes is considered metastasis (described in the M category). Surgery is usually needed to find cancer spread to lymph nodes, since it is not often seen on imaging tests.

NX: Regional lymph nodes cannot be assessed due to lack of information.

N0: There is no regional lymph node spread.

N1: The cancer has spread to a single lymph node in the true pelvis.

N2: The cancer has spread to 2 or more lymph nodes in the true pelvis.

N3: The cancer has spread to lymph nodes that lie along the common iliac artery.

M categories for bladder cancer

M0: There are no signs of distant spread.

M1: The cancer has spread to distant parts of the body. The most common sites are distant lymph nodes, the bones, the lungs, and the liver).

Stages of bladder cancer

Once a patient's T, N, and M categories have been determined, this information is combined to find the overall cancer stage. Bladder cancer stages are defined using 0 and the Roman numerals I to IV (1 to 4). Stage 0 is the earliest and least serious stage, while stage IV is the most advanced and serious.

Stage 0a (Ta, N0, M0)

The cancer is a non-invasive papillary carcinoma. It has grown toward the hollow center of the bladder but has not grown into the connective tissue or muscle of the bladder wall. It has not spread to lymph nodes or distant sites.

Stage 0is (Tis, N0, M0)

The cancer is a flat, non-invasive carcinoma, also known as flat carcinoma in situ (CIS). The cancer is growing in the inner lining layer of the bladder only. It has neither grown inward toward the hollow part of the bladder nor has it invaded the connective tissue or muscle of the bladder wall. It has not spread to lymph nodes or distant sites.

Stage I (T1, N0, M0)

The cancer has grown into the layer of connective tissue under the lining layer of the bladder but has not reached the layer of muscle in the bladder wall. The cancer has not spread to lymph nodes or to distant sites.

Stage II (T2a or T2b, N0, M0)

The cancer has grown into the thick muscle layer of the bladder wall, but it has not passed completely through the muscle to reach the layer of fatty tissue that surrounds the bladder. The cancer has not spread to lymph nodes or to distant sites.

Stage III (T3a, T3b, or T4a, N0, M0)

The cancer has grown completely through the bladder into the layer of fatty tissue that surrounds the bladder (T3). It may have spread into the prostate, uterus, or vagina (T4a). It is not growing into the pelvic or abdominal wall. The cancer has not spread to lymph nodes or to distant sites.

Stage IV

One of the following applies:

T4b, N0, M0: The cancer has grown through the bladder wall and into the pelvic or abdominal wall (T4b). The cancer has not spread to lymph nodes or to distant sites.

OR

Any T, N1 to N3, M0: The cancer has spread to nearby lymph nodes (N1-N3) but not to distant sites.

OR

Any T, any N, M1: The cancer has spread to distant sites such as bones, liver, or lungs (M1).

Survival rates for bladder cancer by stage

Survival rates are often used by doctors as a standard way of discussing a person's prognosis (outlook). Some patients with cancer may want to know the survival statistics for people in similar situations, while others may not find the numbers helpful, or may even not want to know them. Whether or not you want to read about the survival statistics below for bladder cancer is up to you.

The 5-year survival rate refers to the percentage of patients who live *at least* 5 years after their cancer is diagnosed. Of course, many people live much longer than 5 years (and many are cured).

Five-year *relative* survival rates assume that some people will die of other causes and compare the observed survival with that expected for people without the cancer. This is a more accurate way to describe the chances of dying from a particular type and stage of cancer.

In order to get 5-year survival rates, doctors have to look at people who were treated at least 5 years ago. Improvements in treatment since then may result in a more favorable outlook for people now being diagnosed with bladder cancer.

Survival rates are often based on previous outcomes of large numbers of people who had the disease, but they cannot predict what will happen in any particular person's case. Knowing the type and the stage of a person's cancer is important in estimating their outlook. But many other factors may also affect a person's outlook, such as underlying health problems, the grade of the cancer, and how well the cancer responds to treatment. Your doctor can tell you how the numbers below may apply to you, as he or she is familiar with the aspects of your particular situation.

The numbers below are based on thousands of patients diagnosed with bladder cancer from 1988 to 2001. These numbers come from the National Cancer Institute's SEER database.

Stage	Relative 5-year Survival Rate
0	98%
I	88%
II	63%
III	46%
IV	15%

How is bladder 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.

General treatment information

Once your cancer has been diagnosed and staged, there is a lot to think about before you and your doctor choose a treatment plan. You may feel that you must make a decision quickly, but it is important to give yourself time to absorb the information you have just

learned. Ask your cancer care team questions. You can find some good questions to ask in the section, "What should you ask your doctor about bladder cancer?"

You will want to weigh the benefits of each treatment against the possible risks and side effects. The best treatment for you will depend on the type and stage of your bladder cancer as well as your general health, age, and personal preferences.

If time permits, you may want to get a second opinion about your best treatment option. This can be especially helpful if you have several treatment choices. A second opinion can provide more information and help you feel more confident about the treatment plan that you choose.

The main types of treatment for cancer of the bladder are surgery, intravesical therapy, chemotherapy, and radiation therapy. A type of treatment may be given alone or in combination with other types, depending on the stage of the cancer. Surgery, alone or with other treatments, is used in nearly all cases.

Surgery is often able to remove early bladder tumors successfully. But a major concern in people with early stage bladder cancer is that other parts of the bladder are at high risk for eventually developing bladder cancer as well. Removing the entire bladder (radical cystectomy) is one way to avoid this, but it can have major side effects. If the entire bladder is not removed, other treatments may be given to try to reduce the risk of new cancers. Whether or not other treatments are given, close follow-up is needed to look for signs of new cancers in the bladder.

The next few sections describe these different types of treatment for bladder cancer. This is followed by a discussion of the most common treatment options, based on the stage of the cancer.

Surgery for bladder cancer

Surgery is part of the treatment for most bladder cancers. The type of surgery done for bladder cancer will depend on its stage.

Transurethral surgery

For early stage or superficial bladder cancers, a transurethral resection (TUR), also known as a transurethral resection of the bladder tumor (TURBT), is the most common treatment. "Transurethral" means the surgery is done with an instrument passed through the urethra, so it does not require cutting into the abdomen. The surgery is done with either general anesthesia (where you are asleep) or regional anesthesia (where the lower part of your body is numbed).

For this operation, a type of rigid cystoscope called a resectoscope is placed into the bladder through the urethra. The resectoscope has a wire loop at its end to remove any abnormal tissues or tumors. The removed tissue is sent to a pathologist for examination. Most patients have superficial cancer when they are first diagnosed, so this is usually the first treatment they receive.

After surgery, more steps may be taken to try to ensure that the tumor has been completely destroyed. Any remaining cancer may be treated by burning the base of the tumor (fulguration) while looking at it with the cystoscope. Cancer can also be destroyed using the cystoscope and a high-energy laser.

The side effects of transurethral bladder surgery are generally mild and do not usually last long. There may be some bleeding and pain during urination right after surgery. After transurethral surgery, you can usually return home the same day or the next day and can resume your usual activities in less than 2 weeks.

Unfortunately, even with successful treatment, bladder cancer often recurs (comes back) in other parts of the bladder. If transurethral resection needs to be repeated many times, the bladder can become scarred and lose its capacity to hold much urine. This can lead to frequent urination and the chance of not being able to control urination (incontinence).

In patients with a long history of recurrent, non-invasive low-grade tumors, the surgeon may sometimes just use fulguration to burn small tumors that are seen during cystoscopy (rather than removing them). This can often be done under local anesthesia in the doctor's office. It is safe but can be mildly uncomfortable.

Cystectomy

When bladder cancer is invasive, all or part of the bladder may need to be removed. This operation is called a cystectomy.

Partial cystectomy: If the cancer has invaded the muscle but is not very large and only in one place, it can sometimes be removed without taking out the whole bladder. The hole in the bladder wall is then closed. Nearby lymph nodes are also removed and examined for cancer spread. Only a small portion of people with cancer that has invaded the muscle are eligible for this surgery.

The main advantage of this surgery is that it allows a person to keep their bladder and does not require reconstructive surgery (see below). But the remaining bladder may not be able to hold as much urine, requiring more frequent urination. The main concern with this type of surgery is that bladder cancer can still recur in another part of the bladder wall, which is not a concern after radical cystectomy.

Radical cystectomy: If the cancer is larger or is in more than one part of the bladder, a radical cystectomy is needed. This operation removes the entire bladder and nearby lymph nodes. In men, the prostate is also removed. In women, the ovaries, fallopian tubes (tubes that connect the ovaries and uterus), the uterus (womb) and a small portion of the vagina are often removed along with the bladder.

General anesthesia (where you are in a deep sleep) is used for either type of cystectomy.

These surgeries are typically done through a cut (incision) into the abdomen. In some cases, the surgeon may do the operation through several smaller incisions using special long, thin instruments, one of which has a tiny video camera on the end to see inside the pelvis. This is known as laparoscopic, or "keyhole" surgery. The surgeon may either use

the instruments by hand or may sit at a control panel and operate them with a surgical robot. If it can be done, laparoscopic surgery may result in less pain and quicker recovery after the operation (due to the smaller incisions). But it has not been around as long as the standard type of surgery, and it's not yet clear if it is equally as effective.

You will need to stay in the hospital for about a week after the surgery. You can usually go back to your usual activities in 4 to 6 weeks.

The complications and side effects of a cystectomy can be serious. There is a risk of excessive bleeding, urinary tract infections, urine leakage (incontinence), and blockage of urine flow. It is important that this operation be done by a surgeon with experience in treating bladder cancer. Studies have shown there is a wide variation in quality. If the surgery is not done well, the cancer is more likely to come back.

Reconstructive surgery: If your whole bladder is removed, you will need another way to store and remove urine. Several types of reconstructive surgery can be done depending on your medical situation and personal preferences.

One option may be to remove a short piece of the intestine and connect it to the ureters. This creates a passageway, known as an *ileal conduit*, for urine to pass from the kidneys to the outside of the body. Urine flows from the kidneys through the ureters into the ileal conduit. The conduit is connected to the skin on the front of the abdomen by an opening called a *stoma* (also known as a *urostomy*).

After this procedure, a small bag is placed over the stoma to collect the urine, which comes out continuously in small amounts. The bag then needs to be emptied once it is full.

Another way for urine to drain is called a *continent diversion*. For this, a valve is created in a pouch made from the piece of intestine. The valve allows urine to be stored in the pouch. It is emptied several times each day by placing a drainage tube (catheter) into the stoma through the valve. Some patients prefer this method because there is no bag on the outside.

A newer method routes the urine back into the urethra, restoring urination. One way to do this is to create a *neobladder* – a urinary reservoir made of a piece of intestine. As with the ileal conduit and continent diversion, the ureters are connected to the neobladder. The difference is that the neobladder is also sewn to the urethra. This allows the patient to urinate normally.

If the cancer has spread or can't be removed with surgery, a diversion may be made without removing the bladder. In this case, the purpose of the surgery is to prevent or relieve blockage of urine flow, rather than trying to cure the cancer.

Side effects of cystectomy

Cystectomy is a major operation, with short-term risks that include reactions to anesthesia, bleeding, formation of blood clots, and infections. Most people will have at least some pain after the operation, which is usually helped with pain medicines, if needed.

Aside from changes in how urine leaves the body, the possible side effects of urinary diversion and urostomy may include wound infections, urine leaks (incontinence), pouch stones, and blockage of urine flow. Radical cystectomy can also have sexual side effects, as described below. The physical changes that result from removing the bladder and having a urostomy can have a major emotional and psychological impact as well. You should feel free to discuss your feelings and concerns with your health care team.

More about urostomies can be found in our document, *Urostomy: A Guide*.

Sexual effects of radical cystectomy in men: In men, radical bladder surgery removes the prostate gland and seminal vesicles. Since these glands make most of the seminal fluid, removing them means that a man will no longer produce semen. The testicles still make sperm, but instead of exiting the body in semen, it is simply reabsorbed. After radical bladder surgery, orgasm can still occur, but it will be "dry," that is, without semen.

After surgery, many men have nerve damage that prevents them from having an erection. In some men this may improve over time. Generally, the younger a man is, the more likely he is to regain the ability to have full erections. Men younger than 60 (and especially those under 50) have higher recovery rates than older men. If this issue is important to you, you should discuss it with your doctor before surgery. Newer surgical techniques may lower the chance of impotence.

To read more about ways to cope with sexual issues, see our document, *Sexuality for the Man With Cancer*.

Sexual effects of radical cystectomy in women: This surgery often removes half of the vagina, which can make sex less comfortable for some women. Orgasms and lubrication may also be affected. You will want to talk with your surgeon to learn how surgery is likely to affect your sex life.

Most of the time intercourse is still possible. One option is to have the vagina rebuilt, which is known as vaginal reconstruction. There is more than one way to do this, so talk with your surgeon about the pros and cons of each.

If the vagina is not reconstructed, it will be shorter than before, but you may still enjoy intercourse. Certain sexual positions, such as those where the partners are side-by-side or with you on top, limit the depth of penetration. Whether or not you have reconstruction, there are many ways to make intercourse more comfortable.

Radical cystectomy can also affect a woman's ability to have an orgasm. During a cystectomy, the 2 nerve bundles that run along each side of the vagina can be damaged when the front of the vagina is removed. Women who have surgery that preserves these nerve bundles may have better sexual function after surgery than those whose nerve bundles are removed or cut. Talk with your doctor about whether these nerves can be left in place during surgery.

Another possible problem that can happen during radical cystectomy is that the surgeon takes out the end of the urethra where it opens outside the body. This can make the clitoris lose a good deal of its blood supply and may affect some parts of sexual arousal.

Talk with your surgeon about whether the end of the urethra can be spared, and how that may affect your chances of normal clitoris function.

To read more about ways to cope with these and other sexual issues, see our document, *Sexuality for the Woman With Cancer*.

Sexual effects of urostomy: For both men and women, it is normal to be concerned about your sex life with a urostomy. Having your ostomy pouch fit correctly and emptying it before sex reduces the chances of a major leak. A pouch cover or small ostomy pouch can be worn with a sash to keep the pouch out of the way. Wearing a snug fitting shirt may be even more comfortable. To reduce rubbing against the pouch, choose positions for sexual activity that keep your partner's weight off of it.

Bladder preservation versus cystectomy

For patients with early bladder cancer, some urologists prefer bladder preservation, using transurethral resection of the bladder cancer, along with radiation therapy and chemotherapy. Others disagree, and feel that cystectomy is the best treatment.

Some studies support the use of bladder preservation for locally advanced cancer. In these studies, patients who did not respond to treatment with radiation and chemotherapy could safely have their bladders removed with a radical cystectomy at a later date.

It is very important to discuss these options with your doctor so you can decide what kind of treatment is best for you.

Intravesical therapy for bladder cancer

Intravesical therapy is treatment with a drug that is put directly into the bladder (through a catheter) rather than being given by mouth or injected into a vein. This may be either immunotherapy, which causes the body's own immune system to attack the cancer cells, or chemotherapy.

Medicines given this way mainly affect the cells lining the bladder, with little to no effect on cells elsewhere. This means that any cancer cells outside of the bladder lining, including those that have grown deeply into the bladder wall, are not treated. Drugs given into the bladder also can't reach cancer cells in the kidneys, ureters, and urethra, or those that have spread to other organs.

For this reason, intravesical therapy is used only for non-invasive (stage 0) or minimally invasive (stage I) bladder cancers.

Intravesical immunotherapy

Bacillus Calmette-Guerin therapy: Bacillus Calmette-Guerin (BCG) is considered the most effective intravesical immunotherapy for treating low-stage bladder cancer. BCG is a bacterium that is related to the germ that causes tuberculosis (TB), but it does not usually cause serious disease. To treat bladder cancer, BCG is placed directly into the

bladder through a catheter. The body's immune system cells are attracted to the bladder and activated by BCG, which in turn affects the bladder cancer cells. It is usually given once a week for 6 weeks. Sometimes long-term maintenance BCG therapy is given. BCG therapy may be given along with a transurethral resection of the tumor.

Treatment with BCG may cause symptoms that are like having the flu, such as fever, chills, and fatigue. It can also cause a burning feeling in the bladder. Rarely, BCG can spread through the body, leading to a life-threatening infection. One sign of this can be a high fever (greater than 101.5°) that does not get better when you take a pain reliever (such as aspirin, ibuprofen, or acetaminophen). In such cases, you should see a doctor right away. These infections can be treated with the antibiotics used to treat TB.

Interferon: Interferons are substances naturally made by several types of cells in the body that stimulate the immune system. They can also be made in the lab and given as medicine. Interferon-alpha is the type most often used to treat cancer. It can be helpful in the intravesical treatment of bladder cancer.

Possible side effects include muscle aches, bone pain, headaches, problems with thinking and concentration, fatigue, nausea, and vomiting. These problems are usually temporary and improve after treatment is completed. Other drugs may be given along with the interferon to lessen these side effects.

Intravesical chemotherapy

For this treatment, anticancer drugs are put directly into the bladder through a catheter. These chemotherapy drugs kill actively growing cancer cells. Many of these same drugs can also be given systemically (by mouth or into a vein) to treat more advanced stages of bladder cancer.

Mitomycin and thiotepa are the drugs used most often for intravesical chemotherapy. Other drugs that are used include valrubicin, doxorubicin, and gemcitabine. Delivery of mitomycin into the bladder along with heating the inside of the bladder, a treatment called electromotive mitomycin therapy, may work even better than giving intravesical mitomycin the usual way.

One of the main advantages of giving chemotherapy into the bladder instead of as an injection into the bloodstream is that the drugs usually do not reach other parts of the body. This allows you to avoid many of the unwanted side effects that can occur with systemic chemotherapy. An exception to this is the drug thiotepa, which is rarely absorbed from the bladder and can cause side effects in the rest of the body.

The main side effects of intravesical chemotherapy are irritation and a burning feeling in the bladder.

Chemotherapy for bladder cancer

Chemotherapy (chemo) is the use of drugs to treat cancer. Chemotherapy can be given in different ways.

When the drug is put directly into the area to be treated, it is called *local* chemotherapy. Intravesical therapy, where the drug is placed into the bladder, is a form of local chemo. It was described in the previous section.

Cancer is often treated by giving the drugs in pill form, or by injection into a vein (IV) or muscle (IM). The drugs enter the bloodstream and circulate throughout the body. This is called *systemic* chemotherapy. Systemic chemo can affect cancer cells far away from the main tumor. This makes it a good way to attack cancer cells that have spread from the bladder to lymph nodes and other organs.

Chemotherapy is sometimes given before surgery. This is done to try to shrink a large tumor so that it can be more easily removed by surgery. Giving chemo before surgery is known as *neoadjuvant therapy*.

Chemo can also be given after surgery (or sometimes after radiation therapy). This is called *adjuvant therapy*. The goal of adjuvant therapy is to kill any cancer cells that remain after other treatments but are too small to be seen. This can lower the chance that the cancer will come back later.

Sometimes chemotherapy is given with radiation therapy in order to help the radiation work better. Chemo can make the radiation more effective, but it also increases side effects. When chemo is given with radiation, the most common drugs used include:

- Cisplatin
- Cisplatin plus fluorouracil (5-FU)
- Mitomycin with 5-FU

Combining chemotherapy drugs is more effective than using any single drug in treating bladder cancer. When chemo is used without radiation, the combinations used most often for bladder cancer are:

- Gemcitabine and cisplatin
- Methotrexate, vinblastine, doxorubicin (Adriamycin[®]), and cisplatin (called M-VAC)
- Carboplatin and either paclitaxel or docetaxel (Taxotere[®])

For some people, the side effects of getting more than one chemo drug might be too much to handle. Using a single drug, such as gemcitabine or cisplatin, may be a good option.

Other drugs sometimes used for bladder cancer include bleomycin, ifosfamide (Ifex[®]), and pemetrexed (Alimta[®]).

Doctors give chemotherapy in cycles, with each period of treatment followed by a rest period to allow the body time to recover. Each chemotherapy cycle typically lasts for a few weeks.

Chemotherapy for bladder cancer can be hard to tolerate, especially for patients who are older and have other serious medical conditions. Older age itself, however, doesn't mean

that you can't get chemo. Many older patients can tolerate chemotherapy and be helped by treatment. In the end, the decision to have chemotherapy is up to you and your doctor, and should be based on your health, available social support, and personal and family wishes.

Transitional cell (urothelial) cancer accounts for most cases of bladder cancer, but there are other types as well, including squamous cell carcinoma, adenocarcinoma, and small cell carcinoma. Chemotherapy for these rare types of bladder cancer may use different drugs than those listed above. Often, they are treated with the same drugs used to treat these types of tumors when they are found elsewhere in the body.

Side effects of chemotherapy

Chemotherapy drugs attack cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, such as those in the bone marrow (where new blood cells are made), the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells are also likely to be affected by chemotherapy, which can lead to side effects.

Side effects of chemo depend on the drugs used, the amount taken, and the length of treatment. Side effects tend to be worse when chemo and radiation are given at the same time.

Common side effects seen with chemo include:

- Nausea and vomiting
- Loss of appetite
- Hair loss
- Mouth sores
- Diarrhea
- Increased risk of infection (because of a shortage of white blood cells)
- Bleeding or bruising after minor cuts or injuries (due to a shortage of platelets)
- Fatigue (because of low red blood cell counts)

These side effects are usually short-term and go away after treatment is finished. There are often ways to lessen these side effects. For example, drugs can be given to help prevent or reduce nausea and vomiting.

Along with the risks above, some chemotherapy drugs can cause other, less common side effects. For example, drugs such as cisplatin, docetaxel, and paclitaxel can damage nerves. This can sometimes lead to symptoms (mainly in the hands and feet) such as pain, burning or tingling sensations, sensitivity to cold or heat, or weakness. This is called peripheral neuropathy. Some of the drugs used in chemotherapy have been linked to cases of leukemia later in life. This is very rare.

You should report any side effects you notice while getting chemotherapy to your medical team so that they can be treated promptly. In some cases, the doses of the chemotherapy drugs may need to be reduced or treatment may need to be delayed or stopped to prevent the effects from getting worse.

For more information about chemotherapy, please see our document, *Understanding Chemotherapy: A Guide for Patients and Families*.

Radiation therapy for bladder cancer

Radiation therapy uses high-energy radiation to kill cancer cells. External beam radiation therapy focuses radiation from outside of the body on the cancer. This is the type of radiation most often used to treat bladder cancer.

Before your treatments start, the radiation team will take careful measurements to determine the correct angles for aiming the radiation beams and the proper dose of radiation. Radiation therapy is much like getting an x-ray, but the radiation is stronger. The procedure itself is painless. Each treatment lasts only a few minutes, but the setup time – getting you into place for treatment – usually takes longer. Most often, radiation treatments are given 5 days a week for several weeks.

Radiation therapy may be used:

- As part of the treatment for earlier stage bladder cancer, after limited surgery
- As the main treatment for people with earlier stage cancers who can't have surgery
- As part of the initial treatment for advanced bladder cancers
- To help prevent or treat symptoms caused by advanced bladder cancers

Radiation therapy is often combined with chemotherapy to make it more effective. The combination of radiation therapy and chemotherapy given after transurethral bladder surgery is sometimes able to completely destroy cancers that would otherwise need to be treated with cystectomy. This approach can be used to treat smaller tumors (about an inch or less in size) as long as there are no signs of kidney blockage. If the treatment doesn't work or the cancer comes back, you will need cystectomy.

Side effects of radiation therapy

Side effects of radiation depend on the dose given and the area being treated. They tend to be worse if chemotherapy is given with the radiation. Side effects may include:

- Skin changes in areas getting radiation, ranging from redness to severe irritation with blistering
- Nausea and vomiting
- Bladder symptoms, like burning or pain with urination, feeling the need to go often, or blood in the urine

- Diarrhea
- Fatigue
- Low blood counts, which can lead to fatigue, easy bruising or bleeding, or increased risk of infection

These symptoms are usually temporary, although long-term problems sometimes occur. In some people radiation treatments can lead to incontinence (problems holding urine) later on. In some, radiation can damage the lining of the bladder. This is known as *radiation cystitis* and can cause long-term problems such as blood in the urine or pain with urination. If you have side effects from radiation therapy, you should discuss them with your health care team. They can suggest ways to ease many of them.

Clinical trials for bladder cancer

You may 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 choosing 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 carefully controlled research studies that are done with patients who volunteer for them. They are done to get a closer look at promising new treatments or procedures.

If you would like to take part in a clinical trial, you should start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service for a list of clinical trials that meet your medical needs. You can reach this service at 1-800-303-5691 or on our Web site at www.cancer.org/clinicaltrials. 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.

There are requirements you must meet to take part in any clinical trial. If you do qualify for a clinical trial, it is up to you whether or not to enter (enroll in) it.

Clinical trials are one way to get state-of-the art cancer treatment. They are the only way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

You can get a lot more information on clinical trials in our document called *Clinical Trials: What You Need to Know*. You can read it on our Web site or call our toll-free number (1-800-227-2345) and have it sent to you.

Complementary and alternative therapies for bladder cancer

When you have cancer you are likely to hear about ways to treat your cancer or relieve symptoms that your doctor hasn't mentioned. Everyone from friends and family to Internet groups and Web sites may offer ideas for what might help you. These methods

can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

What exactly are complementary and alternative therapies?

Not everyone uses these terms the same way, and they are used to refer to many different methods, so it can be confusing. We use *complementary* to refer to treatments that are used *along with* your regular medical care. *Alternative* treatments are used *instead of* a doctor's medical treatment.

Complementary methods: Most complementary treatment methods are not offered as cures for cancer. Mainly, they are used to help you feel better. Some methods that are used along with regular treatment are meditation to reduce stress, acupuncture to help relieve pain, or peppermint tea to relieve nausea. Some complementary methods are known to help, while others have not been tested. Some have been proven not to be helpful, and a few have even been found harmful.

Alternative treatments: Alternative treatments may be offered as cancer cures. These treatments have not been proven safe and effective in clinical trials. Some of these methods may pose danger, or have life-threatening side effects. But the biggest danger in most cases is that you may lose the chance to be helped by standard medical treatment. Delays or interruptions in your medical treatments may give the cancer more time to grow and make it less likely that treatment will help.

Finding out more

It is easy to see why people with cancer think about alternative methods. You want to do all you can to fight the cancer, and the idea of a treatment with few or no side effects sounds great. Sometimes medical treatments like chemotherapy can be hard to take, or they may no longer be working. But the truth is that most of these alternative methods have not been tested and proven to work in treating cancer.

As you consider your options, here are 3 important steps you can take:

- Look for "red flags" that suggest fraud. Does the method promise to cure all or most cancers? Are you told not to have regular medical treatments? Is the treatment a "secret" that requires you to visit certain providers or travel to another country?
- Talk to your doctor or nurse about any method you are thinking about using.
- Contact us at 1-800-227-2345 to learn more about complementary and alternative methods in general and to find out about the specific methods you are looking at.

The choice is yours

Decisions about how to treat or manage your cancer are always yours to make. If you want to use a non-standard treatment, learn all you can about the method and talk to your doctor about it. With good information and the support of 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 of bladder cancer by stage

Most of the time, initial treatment of bladder cancer is based on the tumor's clinical stage – its size, how deep it has grown into the bladder wall, and whether it has spread beyond the bladder. This is based on the results of exams, cystoscopy, and imaging tests.

Stage 0

Stage 0 bladder cancer includes non-invasive papillary carcinoma (Ta) and flat non-invasive carcinoma (Tis). In either case, the cancer has not invaded the bladder wall beyond the inner layer.

This early stage of bladder cancer is most often treated with transurethral resection (TUR). This may be followed either by observation (without further treatment) or by intravesical therapy to try to keep the cancer from coming back.

In the United States, doctors prescribe intravesical BCG more often than intravesical chemotherapy after TUR. Of these treatments, BCG seems to be better at both keeping cancers from coming back and from getting worse. But it also tends to have more side effects. For this reason, doctors usually reserve BCG for cancers that are more likely to come back as invasive cancer or spread within the bladder, such as high-grade cancers or flat non-invasive carcinomas. Patients with these tumors often get 6 weekly treatments of intravesical BCG, starting at least 2 weeks after TUR. The bladder may be checked again about 6 weeks after the last treatment to look for signs of cancer. Some doctors recommend repeating BCG treatment every 3 to 6 months. BCG treatment reduces the recurrence rate by at least half.

Some doctors prefer to give intravesical chemotherapy after surgery (instead of BCG). Intravesical chemotherapy is more often used in patients with low-grade, non-invasive tumors. This treatment is usually given every week for several weeks. If the cancer comes back, the treatments can be repeated. Low-grade papillary tumors are less likely to come back in a more serious form. Patients with these tumors may receive a single dose of intravesical mitomycin right after surgery.

Stage 0 bladder cancer rarely needs to be treated with partial or radical cystectomy. Cystectomy is considered only when there are many superficial cancers or when a superficial cancer continues to grow (or seems to be spreading) despite treatment.

The outlook for people with stage 0a (non-invasive papillary) bladder cancer is excellent. These cancers are nearly always cured with the right treatment. During long-term follow-up care, more superficial cancers are often found in the bladder or elsewhere in the urinary system. Although these new cancers do need to be treated, they rarely are deeply invasive or life threatening.

The long-term prognosis for stage 0is bladder cancer (also known flat non-invasive cancer) is not quite as good. These cancers have a higher risk of coming back, and may return as a more serious cancer, one that is growing into deeper layers of the bladder or has spread to other tissues.

Stage I

Stage I bladder cancers have grown into the connective tissue layer of the bladder wall but have not reached the muscle layer.

These cancers are often treated like stage 0 cancers, with transurethral resection (TUR) followed by intravesical therapy with BCG or chemotherapy. However, over half of these patients later get a new bladder cancer. In many cases, the new cancer will invade the bladder muscle and be a higher stage. This is more likely to happen if the first cancer is high grade. If this happens, radical cystectomy may be needed.

If the cancer is high-grade, if many tumors are present, or if the tumor is extremely large, even when it is first found, radical cystectomy may be recommended as the initial treatment. This is done to try to keep the cancer from coming back and spreading elsewhere. Another option for some high-grade tumors may be transurethral resection (TUR) followed by a combination of chemotherapy and radiation.

For people who can't have a cystectomy, radiation therapy (often along with chemo) may be an option as the main treatment, although the chances for cure may not be as good.

Stage II

These cancers have invaded the muscle layer of the bladder wall. Radical cystectomy is the standard treatment for these cancers. Lymph nodes near the bladder are often removed as well. Some patients with cancer in only one part of the bladder can be treated with a partial cystectomy instead, but only a small number of patients are good candidates for this.

Although at this stage cancer cells have not been detected outside the bladder, in some cases there may already be tiny deposits of cancer growing elsewhere in the body. These tiny deposits, called *micrometastases*, are too small to see on imaging tests but may eventually grow to become life threatening. This risk is greater with more deeply invasive cancers and higher-grade cancers. For this reason, chemotherapy is often given either before surgery (neoadjuvant chemo) or after surgery (adjuvant chemo) to lower the chance the cancer will come back in a distant site. It is not clear which is better. Each has its advantages.

Another option may be transurethral resection (TUR), followed by radiation and chemotherapy. This approach is only used when there is a single, small tumor with no CIS on biopsy and the tumor is blocking urine flow from a kidney. If the cancer comes back and cannot be controlled by local treatment, cystectomy can still be done. If this treatment is used you will need frequent and careful follow-up exams. Some experts

recommend a repeat cystoscopy with biopsy during treatment with chemo and radiation. If cancer is found on the biopsy, cystectomy will be needed.

For patients who cannot have a major operation because of other serious medical conditions, TUR, radiation, or chemotherapy may be used as the only treatment. If the patient is well enough, chemotherapy may be given along with radiation therapy to help it work better.

Stage III

These cancers have reached the outside of the bladder and may have grown into nearby tissues or organs. Stage III cancers are treated much in the same way as stage II tumors. Radical cystectomy, with removal of nearby lymph nodes, is the standard treatment for stage III bladder cancer. Partial cystectomy is seldom an option for stage III cancers.

Chemotherapy is often given before surgery. This is called *neoadjuvant* therapy and it can shrink the tumor, which may make surgery easier. This can be especially useful for T4a tumors. The chemotherapy may also kill any cancer cells that may already have spread to other areas of the body. This approach has been shown to help patients live longer than cystectomy alone. When chemotherapy is given first, surgery to remove the bladder is delayed. The delay is not a problem if the chemotherapy causes the bladder cancer to shrink, but it can be harmful if the tumor continues to grow during chemotherapy.

Some patients get chemotherapy after surgery, which is called *adjuvant* treatment. It is meant to kill any cancer cells that remain after surgery but are too small to see. Chemotherapy given only after cystectomy may help patients stay cancer-free longer, but so far it's not clear if it helps them live longer.

Some patients with T3a cancers can be treated with a transurethral resection (TUR) of the tumor followed by a combination of chemotherapy and radiation. If this isn't successful and cancer is found when cystoscopy is repeated, then the patient may need cystectomy. This bladder-sparing approach is not an option if the bladder has more than one tumor, if CIS is present, or if the tumor is blocking urine flow from a kidney.

For patients who cannot have a major operation because of other serious medical conditions, TUR, radiation, or chemotherapy may be used as the only treatment. If the patient is well enough, chemotherapy may be given along with radiation therapy to help it work better.

Stage IV

These cancers have reached the abdominal or pelvic wall (T4b tumors) or have spread to nearby lymph nodes or distant parts of the body.

In most cases surgery (even radical cystectomy) cannot remove all of the cancer at this stage, so these cancers are very hard to treat successfully. Treatment is usually aimed at slowing the cancer's growth and spread to help you live longer and feel better. If your

doctor discusses surgery as treatment option, be sure you understand the goal of the operation – whether it is to try to cure the cancer, to help you live longer, or to help prevent or relieve symptoms from the cancer – before deciding on treatment.

For stage IV bladder cancers that have not spread to distant sites, chemotherapy (with or without radiation) is usually the first treatment. If the cancer shrinks in response to treatment, a cystectomy may be an option. Patients who can't tolerate chemotherapy (because of other health problems) are often treated with radiation therapy.

For stage IV bladder cancers with distant spread, chemotherapy is usually the first treatment, sometimes along with radical cystectomy or radiation therapy. Patients who can't tolerate chemotherapy (because of other health problems) are often treated with radiation therapy. Urinary diversion without cystectomy is sometimes done to prevent or relieve a blockage of urine that could otherwise cause severe kidney damage.

Because treatment is unlikely to cure these cancers, taking part in a clinical trial may offer you access to newer forms of treatment that might help you live longer or relieve symptoms.

Recurrent bladder cancer

When a cancer comes back after treatment, it is called recurrent. Recurrence can be local (in or near the place it started) or distant (spread to organs such as the lungs or bone). The outlook and treatment of recurrent bladder cancer depends on the location and extent of the recurrent cancer and the type of prior treatment. If cancer continues to grow during treatment or comes back, further treatment will depend on the extent of the cancer, what treatments have been used, and a person's health and desire for further treatment.

For example, non-invasive bladder cancers often recur locally in the bladder. The new cancer may be found either in the same site as the original cancer or at other sites in the bladder. These tumors are often treated the same way as the first tumor. But if the tumor keeps coming back, then the patient may need a cystectomy at some point.

Cancers that recur in distant sites can be harder to remove with surgery and may require other treatments, such as chemotherapy or radiation therapy.

At some point, it may become clear that standard treatments are no longer controlling the cancer. If you want to continue anti-cancer treatment, you might think about taking part in a clinical trial of newer bladder cancer treatments. While these are not always the best option for every person, they may benefit you as well as future patients.

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 many of the nation's leading cancer centers, develops cancer treatment guidelines for doctors to use when treating patients. These are available on the NCCN Web site (www.nccn.org).

The NCI provides treatment information via telephone (1-800-4-CANCER) and its Web site (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.

What should you ask your doctor about bladder cancer?

It is important for you to have honest, open discussions with your cancer care team. They want to answer all of your questions, no matter how minor you might think they are. Some questions to consider:

- What type of bladder cancer do I have?
- Do you think my cancer has spread beyond the bladder?
- What is the stage and grade of my cancer, and what does that mean in my case?
- Are there other tests that need to be done before we can decide on treatment?
- Are there other doctors I need to see?
- How much experience do you have treating this type of cancer?
- What are my treatment options?
- What do you recommend and why?
- What is the goal of the treatment?
- What are the chances my cancer can be cured with these options?
- What are the risks or side effects that I should expect? How long are they likely to last?
- If my bladder is removed, what are my options for urinary diversion? What are the pros and cons of each?
- How quickly do we need to decide on treatment?
- What should I do to prepare for treatment?
- Should I follow a special diet?
- How long will treatment last? What will it involve? Where will it be done?
- What would we do if the treatment doesn't work or if the cancer recurs?

- What type of follow-up will I need after treatment?

Along with these sample questions, be sure to write down some of your own. For instance, you might want more information about recovery times so you can plan your work or activity schedule. You may also want to ask about second opinions or about clinical trials for which you may qualify.

What will happen after treatment for bladder cancer?

For some people with bladder cancer, treatment may remove or destroy the cancer. Completing treatment can be both stressful and exciting. You may be relieved to finish treatment, but find it hard not to worry about cancer growing or coming back. (When cancer comes back after treatment, it is called *recurrence*.) This is a very common concern in people who have had cancer.

It may take a while before your fears lessen. But it may help to know that many cancer survivors have learned to live with this uncertainty and are living full lives. Our document, *Living With Uncertainty: The Fear of Cancer Recurrence*, gives more detailed information on this.

For other people, the bladder cancer may never go away completely. These people may get regular treatments with chemotherapy, radiation therapy, or other therapies to help keep the cancer in check. Learning to live with cancer as a more of a chronic disease can be difficult and very stressful. It has its own type of uncertainty.

Follow-up care

If you have completed treatment, your doctors will still want to watch you closely. People who have had bladder cancer are at high risk of developing a second bladder cancer, so it is very important to go to all of your follow-up appointments. During these visits, your doctors will ask questions about any problems you may have and may do exams, lab tests (such as urine cytology), and imaging tests. These tests are described in the section "How is bladder cancer diagnosed?"

In people with no signs of cancer remaining, most experts recommend repeat exams every 3 to 6 months to see if the cancer is growing back or if there is a new cancer within the urinary system. Your specific schedule of exams and tests will depend on the original extent and grade of the cancer, what treatments you've had, and other factors. Be sure to follow your doctor's advice about follow-up tests. A typical follow-up plan includes urine cytology, a general physical exam, imaging tests, and routine blood tests. If your bladder has not been removed, regular cystoscopy exams will be part of the plan as well. The time between doctor visits may be extended after a few years if no new cancers are seen.

Some doctors recommend other lab tests as well, such as flow cytometry, image cytometry, or tumor marker tests. There are many different kinds of urine tests that can

help see if the cancer is coming back, but so far none of these can take the place of cystoscopy.

Follow-up is needed to check for cancer recurrence or spread, as well as possible side effects of certain treatments. This is the time for you to talk to your cancer care team about any changes or problems you notice and any questions or concerns you have.

Almost any cancer treatment can have side effects. Some may last for a few weeks to several months, but others can last the rest of your life. 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.

If cancer does recur, treatment will depend on the location of the cancer and what treatments you've had before. It may be surgery, intravesical therapy, radiation therapy, chemotherapy, or some combination of these. For more information on how recurrent cancer is treated, see the section "Treatment of bladder cancer by stage." For more general information on dealing with a recurrence, you may also want to see our document, *When Your Cancer Comes Back: Cancer Recurrence*. You can get this document by calling 1-800-227-2345.

For patients with a urostomy

If you have a urostomy, you may feel worried about even everyday activities at first. It's normal to have worries and concerns when adjusting to such a major change, but it's important to know there are health care professionals who are specially trained to help people with their urostomies. They can teach you about the care of your urostomy and help you cope with the changes it brings. You can also ask the American Cancer Society about programs offering information and support in your area. For more information, see our document, *Urostomy: A Guide*.

Seeing a new doctor

At some point after your cancer diagnosis and treatment, you may find yourself seeing a new doctor who does not know anything about your medical history. It is important that you be able to give your new doctor the details of your diagnosis and treatment. Make sure you have this information handy:

- A copy of your pathology report(s) from any biopsies or surgeries
- Copies of imaging tests (CT or MRI scans, etc.), which can usually be stored on a CD, DVD, etc.
- If you had surgery, a copy of your operative report(s)
- If you were in the hospital, a copy of the discharge summary that doctors prepare when patients are sent home
- If you had radiation therapy, a summary of the type and dose of radiation and when and where it was given

- If you had chemotherapy, a list of the drugs, drug doses, and when you took them

It is also important to keep health insurance. Tests and doctor visits cost a lot, and even though no one wants to think of their cancer coming back, this could happen.

Lifestyle changes

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 choices to help you stay healthy and feel as well as you can. This can 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 start during cancer treatment.

Making healthier choices

For many people, a diagnosis of cancer helps them focus on their health in ways they may not have thought much about in the past. Are there things you could do that might make you healthier? Maybe you could try to eat better or get more exercise. Maybe you could cut down on the alcohol, or give up tobacco. Even things like keeping your stress level under control may help. Now is a good time to think about making changes that can have positive effects for the rest of your life. You will feel better and you will also be healthier.

You can start by working on those things that worry you most. 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 for information and support. This tobacco cessation and coaching service can help increase your chances of quitting for good.

Eating better

Eating right can be hard for anyone, but it can get even tougher during and after cancer treatment. Treatment may change your sense of taste. Nausea can be a problem. You may not feel like eating and lose weight when you don't want to. Or you may have gained weight that you can't seem to lose. All of these things can be very frustrating.

If treatment caused weight changes or eating or taste problems, do the best you can and keep in mind that these problems usually get better over time. You may find it helps to eat small portions every 2 to 3 hours until you feel better. You may also want to ask your cancer team about seeing a dietitian, an expert in nutrition who can give you ideas on how to deal with these treatment side effects.

One of the best things you can do after cancer treatment is put healthy eating habits into place. You may be surprised at the long-term benefits of some simple changes, like increasing the variety of healthy foods you eat. Getting to and staying at a healthy weight, eating a healthy diet, and limiting your alcohol intake may lower your risk for a number of types of cancer, as well as having many other health benefits.

Rest, fatigue, and exercise

Extreme tiredness, called *fatigue*, is very common in people treated for cancer. This is not a normal tiredness, but a "bone-weary" exhaustion that doesn't get better with rest. For some people, fatigue lasts a long time after treatment, and can make it hard for them to exercise and do other things they want to do. But exercise can help reduce fatigue. Studies have shown that patients who follow an exercise program tailored to their personal needs feel better physically and emotionally and can cope better, too.

If you were sick and not very active during treatment, it is normal for your fitness, endurance, and muscle strength to decline. Any plan for 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 twice a week. If you haven't exercised in a few years, you will have to start slowly – maybe just by taking short walks.

Talk with your health care team before starting anything. Get their opinion about your exercise plans. Then, try to find an exercise buddy so 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, you will need to balance activity with rest. It is OK to rest when you need to. Sometimes it's really hard for people to allow themselves to rest when they are used to working all day or taking care of a household, but this is not the time to push yourself too hard. Listen to your body and rest when you need to. (For more information on dealing with fatigue, please see *Fatigue in People With Cancer* and *Anemia in People With Cancer*.)

Keep in mind exercise can improve your physical and emotional health.

- It improves your cardiovascular (heart and circulation) fitness.
- Along with a good diet, it will help you get to and stay at a healthy weight.
- It makes your muscles stronger.
- It reduces fatigue and helps you have more energy.
- It can help lower anxiety and depression.
- It can make you feel happier.
- It helps you feel better about yourself.

And long term, we know that getting regular physical activity plays a role in helping to lower the risk of some cancers, as well as having other health benefits.

Can I lower my risk of the cancer progressing or coming back?

Most people want to know if there are specific lifestyle changes they can make to reduce their risk of cancer progressing or coming back. Unfortunately, for most cancers there is little solid evidence to guide people. This doesn't mean that nothing will help – it's just that for the most part this is an area that hasn't been well studied. Most studies have looked at lifestyle changes as ways of preventing cancer in the first place, not slowing it down or preventing it from coming back.

At this time, not enough is known about bladder cancer to say for sure if there are things you can do that will be helpful. Adopting healthy behaviors such as not smoking, eating well, and maintaining a healthy weight may help, but no one knows for sure. However, we do know that these types of changes can have positive effects on your health that can extend beyond your risk of cancer.

How about your emotional health?

During and after treatment, you may find yourself overcome with many different emotions. This happens to a lot of people.

You may find yourself thinking about death and dying. Or maybe you're more aware of the effect the cancer has on your family, friends, and career. You may take a new look at your relationships with those around you. Unexpected issues may also cause concern. For instance, you may see your health care team less often after treatment and have more time on your hands. These changes can make some people anxious.

Almost everyone who is going through or has been through cancer can benefit from getting some type of 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 one-on-one counselors. 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 good for you to try to deal with everything on your own. And your friends and family may feel shut out if you do not 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 1-800-227-2345 and we can put you in touch with a group or resource that may work for you.

What happens if treatment is no longer working?

If cancer keeps growing or comes back after one kind of treatment, it may be 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. But when a person has tried many different treatments and the cancer has not gotten any better, the cancer tends to become

resistant to all treatment. If this happens, it's important to weigh the possible limited benefits of a new treatment against the possible downsides, including treatment side effects. Everyone has their own way of looking at this.

This is likely to be the hardest part of your battle with cancer – when you have been through many medical treatments and nothing's working anymore. Your doctor may offer you new options, but at some point you may need to consider that treatment is not likely to improve your health or change your outcome or survival.

If you want to continue to get treatment for as long as you can, you need to think about the odds of treatment having any benefit and how this compares to the possible risks and side effects. In many cases, your doctor can estimate how likely it is the cancer will respond to treatment you are considering. For instance, the doctor may say that more treatment might have about a 1 in 100 chance of working. Some people are still tempted to try this. But it is important to think about and understand your reasons for choosing this plan.

No matter what you decide to do, it is important that you feel as good as you can. Make sure you are asking for and getting treatment for any symptoms you might have, such as nausea or pain. This type of treatment is called *palliative care*.

Palliative care helps relieve symptoms, but is not expected to cure the disease. It can be given along with cancer treatment, or can even be cancer treatment. The difference is its purpose – the main purpose of palliative care is to improve the quality of your life, or help you feel as good as you can for as long as you can. Sometimes this means using drugs to help with symptoms like pain or nausea. Sometimes, though, the treatments used to control your symptoms are the same as those used to treat cancer. For instance, radiation might be used to help relieve bone pain caused by cancer that has spread to the bones. Or chemo might be used to help shrink a tumor and keep it from blocking the bowels. But this is not the same as treatment to try to cure the cancer.

At some point, you may benefit from hospice care. This is special care that treats the person rather than the disease; it focuses on quality rather than length of life. Most of the time, it is given at home. Your cancer may be causing problems that need to be managed, and hospice focuses on your comfort. You should know that while getting hospice care often means the end of treatments such as chemo and radiation, it doesn't mean you can't have treatment for the problems caused by your cancer or other health conditions. In hospice the focus of your care is on living life as fully as possible and feeling as well as you can at this difficult time. You can learn more about hospice in our document called *Hospice Care*.

Staying hopeful is important, too. 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. Pausing at this time in your cancer treatment gives you a chance to refocus on the most important things in your life. Now 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. Though the cancer may be beyond your control, there are still choices you can make.

What's new in bladder cancer research and treatment?

Understanding genetic changes in bladder cancer

During the past few decades scientists have made great progress in learning about the differences between normal cells and cancer cells. They are also finding out how these differences cause cells to grow too much and spread to other parts of the body. Several changes in the DNA (genetic material) of bladder cancers have been found. These findings have helped us understand more about this disease. Researchers are now trying to determine if tests that identify these DNA changes can help predict the prognosis (outlook) of bladder cancer patients (which might affect treatment) or if they are useful in finding bladder cancers that recur (come back) after treatment.

Urine tests to look for bladder cancer

Several newer tests look for substances in the urine that might indicate a person has bladder cancer. These tests are used mainly to help diagnose bladder cancer or to look for recurrence in people who have already been treated. Researchers are now looking to see if these tests might be helpful even earlier, to screen for bladder cancer in people without symptoms (see "Can bladder cancer be found early?").

One new test looks for a substance called *telomerase* in the urine. Telomerase is an enzyme that is found often in cancer cells. Early results with this test have been promising, and more studies are now under way.

Reducing the risk of bladder cancer recurrence

A major concern in people who have had bladder cancer is that they are at risk for developing a new cancer in bladder or other parts of the urinary tract (including the lining of the kidneys, ureters, and urethra).

Studies are now looking to see if certain vitamins (such as vitamin E), minerals (such as selenium), dietary supplements (such as green tea extract and broccoli sprout extract), chemotherapy drugs, or other drugs can reduce the risk of a second bladder cancer. Researchers are also looking to see if vaccines can boost the body's immune system and help lower the risk of a second cancer.

Bladder cancer treatment

Several newer types of treatment are now being studied for used against bladder cancer.

Photodynamic therapy

Photodynamic therapy (PDT) is a newer treatment method that may be useful in treating early stage bladder cancers. Its usefulness is still being studied.

For this treatment, a special light-sensitive drug is injected into the blood and allowed to collect in the tumor cells for a few days. Then a special type of laser light is focused on the inner lining of the bladder through a cystoscope. The light changes the drug in the cancer cells into a new chemical that can kill them.

The advantage of PDT is that it can kill cancer cells with very little harm to nearby normal cells. One drawback is that the chemical must be activated by light, so only cancers near the surface of the bladder lining can be treated in this way. This light cannot reach cancers that have grown deeper into the bladder wall or have spread to other organs.

The main side effect of PDT is an intense sensitivity to the sun that can last for several weeks after therapy. Even small amounts of sunlight can cause severe burns in a short time, so it is very important to take precautions while getting this treatment.

Targeted therapies

As researchers have learned more about some of the changes in bladder cells that cause them to become cancerous, they have begun to develop drugs that target these changes. These new targeted drugs work differently than standard chemo drugs. They tend to have different (and often less severe) side effects.

Many targeted drugs are already in use to treat other types of cancer. Some of these drugs are now being studied for use against bladder cancer as well, including sunitinib (Sutent[®]), lapatinib (Tykerb[®]), erlotinib (Tarceva[®]), trastuzumab (Herceptin[®]), and gefitinib (Iressa[®]).

Other drugs target the blood vessels that allow tumors to grow. These are known as anti-angiogenesis drugs. Examples include bevacizumab (Avastin[®]) and sorafenib (Nexavar[®]), which are already used for some other types of cancer. They are now being studied for use against bladder cancer, usually combined with chemotherapy.

Gene therapy

Gene therapy – adding or changing the actual genes inside cancer cells or other cells in the body – is another new method being tested for bladder cancer. One of these approaches uses special viruses that have been modified in the lab. The modified virus is injected into the bladder and infects the bladder cancer cells. When this infection occurs, the virus injects a gene into the cells for GM-CSF, an immune system hormone (cytokine) that may help activate immune system cells to attack the cancer. This and other approaches to gene therapy are still in the early stages of development.

Additional resources for bladder cancer

More information from your American Cancer Society

We have some related information that may also be helpful to you. These materials may be ordered from our toll-free number.

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

Caring for the Patient With Cancer at Home: A Guide for Patients and Families (also available in Spanish)

Clinical Trials: What You Need to Know

Living with Uncertainty: The Fear of Cancer Recurrence

Pain Control: A Guide for People With Cancer and Their Families (also available in Spanish)

Questions About Smoking, Tobacco, and Health (also available in Spanish)

Sexuality for the Man With Cancer (also available in Spanish)

Sexuality for the Woman With Cancer (also available in Spanish)

Surgery (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)

Urostomy: A Guide

When Your Cancer Comes Back: Cancer Recurrence

The following books are available from the American Cancer Society. Call us at 1-800-227-2345 to ask about costs or to place your order.

American Cancer Society Complete Guide to Complementary & Alternative Cancer Therapies

American Cancer Society Complete Guide to Nutrition for Cancer Survivors

American Cancer Society's Guide to Pain Control, Second Edition

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

Caregiving: A Step-By-Step Resource for Caring for the Person With Cancer at Home

What Helped Me Get Through: Cancer Patients Share Wisdom and Hope

What to Eat During Cancer Treatment

When the Focus Is on Care: Palliative Care and Cancer

National organizations and web sites

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

American Urological Association Foundation

Toll-free number: 1-800-828-7866

Web site:

/AboutUs/Redirect/index?h=<http://www.auanet.org&n=American%20Urological%20Association>
www.urologyhealth.org

/AboutUs/Redirect/index?h=<http://www.blcwebcafe.org&n=Bladder%20Cancer%20Webcafe>

Bladder Cancer Advocacy Network (BCAN)

Web site: www.bcan.org

Bladder Cancer Webcafe

Web site: www.blcwebcafe.org

National Cancer Institute

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

Web site: www.cancer.gov

United Ostomy Associations of America, Inc. (UOAA)

Toll-free number: 1-800-826-0826

Web site: www.uoaa.org

International Ostomy Association

Web site: www.ostomyinternational.org

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at **1-800-227-2345** or visit www.cancer.org.

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1 · 800 · ACS-2345 or www.cancer.org