



Cervical Cancer

What is cancer?

The body is made up of trillions of living cells. Normal body cells grow, divide to make new cells, and die in an orderly way. 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. In most cases the cancer cells form a tumor. Cancer cells can also invade (grow into) other tissues, something that normal cells can't 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 is 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 abnormal cell does.

People can inherit damaged DNA, but most often the 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.

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 (and treated) based on for the place it started. For example, breast cancer that has spread to the liver is still called breast cancer,

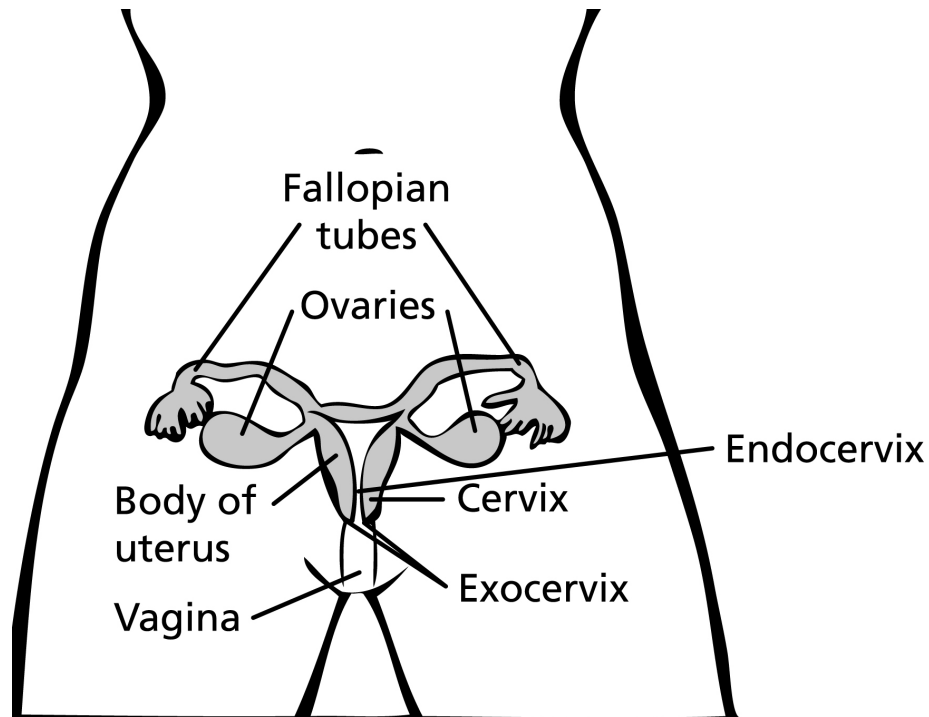
not liver cancer. Likewise, breast cancer that has spread to the bone is still breast cancer, not bone cancer.

Different types of cancer can behave very differently. 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 cervical cancer?

Cervical cancer starts in the cells lining the cervix -- the lower part of the uterus (womb). This is sometimes called the *uterine cervix*. The fetus grows in the body of the uterus (the upper part). The cervix connects the body of the uterus to the vagina (birth canal). The part of the cervix closest to the body of the uterus is called the *endocervix*. The part next to the vagina is the *exocervix* (or *ectocervix*). The 2 main types of cells covering the cervix are *squamous* cells (on the exocervix) and *glandular* cells (on the endocervix). These 2 cell types meet at a place called the *transformation zone*. The exact location of the transformation zone changes as you age and if you give birth.



Most cervical cancers begin in the cells in the transformation zone. These cells do not suddenly change into cancer. Instead, the normal cells of the cervix first gradually develop pre-cancerous changes that turn into cancer. Doctors use several terms to describe these pre-cancerous changes, including *cervical intraepithelial neoplasia (CIN)*, *squamous intraepithelial lesion (SIL)*, and *dysplasia*. These changes can be detected by the Pap test and treated to prevent cancer from developing (see "Can cervical cancer be prevented?").

Cervical cancers and cervical pre-cancers are classified by how they look under a microscope. The main types of cervical cancers are *squamous cell carcinoma* and *adenocarcinoma*.

Most (up to 9 out of 10) cervical cancers are squamous cell carcinomas. These cancers form from cells in the exocervix and the cancer cells have features of squamous cells under the microscope. Squamous cell carcinomas most often begin in the transformation zone (where the exocervix joins the endocervix).

Most of the other cervical cancers are adenocarcinomas. Adenocarcinomas are cancers that develop from gland cells. Cervical adenocarcinoma develops from the mucus-producing gland cells of the endocervix. Cervical adenocarcinomas seem to have become more common in the past 20 to 30 years.

Less commonly, cervical cancers have features of both squamous cell carcinomas and adenocarcinomas. These are called *adenosquamous carcinomas* or mixed carcinomas.

Although cervical cancers start from cells with pre-cancerous changes (pre-cancers), only some of the women with pre-cancers of the cervix will develop cancer. It usually takes several years for cervical pre-cancer to change to cervical cancer, but it can happen in less than a year. For most women, pre-cancerous cells will go away without any treatment. Still, in some women pre-cancers turn into true (invasive) cancers. Treating all cervical pre-cancers can prevent almost all true cervical cancers. Pre-cancerous changes and specific types of treatment for pre-cancers are discussed in our document *Cervical Cancer Prevention and Early Detection*.

Although almost all cervical cancers are either squamous cell carcinomas or adenocarcinomas, other types of cancer also can develop in the cervix. These other types, such as melanoma, sarcoma, and lymphoma, occur more commonly in other parts of the body.

This document only discusses the more common cervical cancer types, and not the rare types.

What are the key statistics about cervical cancer?

The American Cancer Society's estimates for cervical cancer in the United States for 2015 are:

- About 12,900 new cases of invasive cervical cancer will be diagnosed.
- About 4,100 women will die from cervical cancer.

Cervical pre-cancers are diagnosed far more often than invasive cervical cancer.

Cervical cancer was once one of the most common causes of cancer death for American women. But over the last 30 years, the cervical cancer death rate has gone down by more than 50%. The main reason for this change was the increased use of the Pap test. This screening procedure can find changes in the cervix before cancer develops. It can also find cervical cancer early – in its most curable stage.

Cervical cancer tends to occur in midlife. Most cases are found in women younger than 50. It rarely develops in women younger than 20. Many older women do not realize that the risk of developing cervical cancer is still present as they age. More than 15% of cases of cervical cancer are found in women over 65. However these cancers rarely occur in women who have been getting regular tests to screen for cervical cancer before they were 65. See the section, "Can cervical cancer be prevented?" and our document *Cervical Cancer Prevention and Early Detection* for more information about tests used to screen for cervical cancer.

In the United States, Hispanic women are most likely to get cervical cancer, followed by African-Americans, Asians and Pacific Islanders, and whites. American Indians and Alaskan natives have the lowest risk of cervical cancer in this country.

What are the risk factors for cervical cancer?

A risk factor is anything that changes your chance of getting a disease such as cancer. Different cancers have different risk factors. For example, exposing skin to strong sunlight is a risk factor for skin cancer. Smoking is a risk factor for many cancers. But having a risk factor, or even several, does not mean that you will get the disease.

Several risk factors increase your chance of developing cervical cancer. Women without any of these risk factors rarely develop cervical cancer. Although these risk factors increase the odds of developing cervical cancer, many women with these risks do not develop this disease. When a woman develops cervical cancer or pre-cancerous changes, it may not be possible to say with certainty that a particular risk factor was the cause.

In thinking about risk factors, it helps to focus on those you can change or avoid (like smoking or human papilloma virus infection), rather than those you cannot (such as your age

and family history). However, it is still important to know about risk factors that cannot be changed, because it's even more important for women who have these factors to get regular Pap tests to detect cervical cancer early.

Cervical cancer risk factors include:

Human papilloma virus infection

The most important risk factor for cervical cancer is infection by the human papilloma virus (HPV). HPV is a group of more than 150 related viruses, some of which cause a type of growth called *papillomas*, which are more commonly known as *warts*.

HPV can infect cells on the surface of the skin, and those lining the genitals, anus, mouth and throat, but not the blood or internal organs such as the heart or lungs.

HPV can be spread from one person to another during skin-to-skin contact. One way HPV is spread is through sex, including vaginal, anal, and even oral sex.

Different types of HPVs cause warts on different parts of the body. Some cause common warts on the hands and feet; others tend to cause warts on the lips or tongue.

Certain types of HPV may cause warts on or around the female and male genital organs and in the anal area. These are called *low-risk types* of HPV because they are seldom linked to cancer.

Other types of HPV are called *high-risk types* because they are strongly linked to cancers, including cancer of the cervix, vulva, and vagina in women, penile cancer in men, and cancers of the anus, mouth, and throat in both men and women.

Doctors believe that a woman must be infected with HPV in order to develop cervical cancer. Although this can mean infection with any of the high-risk types, about two-thirds of all cervical cancers are caused by HPV 16 and 18.

Infection with HPV is common, and in most people the body can clear the infection by itself. Sometimes, however, the infection does not go away and becomes chronic. Chronic infection, especially when it is caused by certain high-risk HPV types, can eventually cause certain cancers, such as cervical cancer.

Although there is currently no cure for HPV infection, there are ways to treat the warts and abnormal cell growth that HPV causes.

For more information on about this topic, see our documents *Cervical Cancer Prevention and Early Detection* and *HPV and HPV Testing*.

Smoking

When someone smokes, they and those around them are exposed to many cancer-causing chemicals that affect organs other than the lungs. These harmful substances are absorbed through the lungs and carried in the bloodstream throughout the body. Women who smoke are about twice as likely as non-smokers to get cervical cancer. Tobacco by-products have been found in the cervical mucus of women who smoke. Researchers believe that these substances damage the DNA of cervix cells and may contribute to the development of cervical cancer. Smoking also makes the immune system less effective in fighting HPV infections.

Immunosuppression

Human immunodeficiency virus (HIV), the virus that causes AIDS, damages the immune system and puts women at higher risk for HPV infections. This might explain why women with AIDS have a higher risk for cervical cancer. The immune system is important in destroying cancer cells and slowing their growth and spread. In women with HIV, a cervical pre-cancer might develop into an invasive cancer faster than it normally would. Another group of women at risk of cervical cancer are those taking drugs to suppress their immune response, such as those being treated for an autoimmune disease (in which the immune system sees the body's own tissues as foreign and attacks them, as it would a germ) or those who have had an organ transplant.

Chlamydia infection

Chlamydia is a relatively common kind of bacteria that can infect the reproductive system. It is spread by sexual contact. Chlamydia infection can cause pelvic inflammation, leading to infertility. Some studies have seen a higher risk of cervical cancer in women whose blood test results show evidence of past or current chlamydia infection (compared with women who have normal test results). Women who are infected with chlamydia often have no symptoms. In fact, they may not know that they are infected at all unless they are tested for chlamydia during a pelvic exam.

A diet low in fruits and vegetables

Women whose diets don't include enough fruits and vegetables may be at increased risk for cervical cancer.

Being overweight

Overweight women are more likely to develop adenocarcinoma of the cervix.

Long-term use of oral contraceptives (birth control pills)

There is evidence that taking oral contraceptives (OCs) for a long time increases the risk of cancer of the cervix. Research suggests that the risk of cervical cancer goes up the longer a woman takes OCs, but the risk goes back down again after the OCs are stopped. In one study, the risk of cervical cancer was doubled in women who took birth control pills longer than 5 years, but the risk returned to normal 10 years after they were stopped.

The American Cancer Society believes that a woman and her doctor should discuss whether the benefits of using OCs outweigh the potential risks. A woman with multiple sexual partners should use condoms to lower her risk of sexually transmitted illnesses no matter what other form of contraception she uses.

Intrauterine device use

A recent study found that women who had ever used an intrauterine device (IUD) had a lower risk of cervical cancer. The effect on risk was seen even in women who had an IUD for less than a year, and the protective effect remained after the IUDs were removed.

Using an IUD might also lower the risk of endometrial (uterine) cancer. However, IUDs do have some risks. A woman interested in using an IUD should first discuss the possible risks and benefits with her doctor. Also, a woman with multiple sexual partners should use condoms to lower her risk of sexually transmitted illnesses no matter what other form of contraception she uses.

Having multiple full-term pregnancies

Women who have had 3 or more full-term pregnancies have an increased risk of developing cervical cancer. No one really knows why this is true. One theory is that these women had to have had unprotected intercourse to get pregnant, so they may have had more exposure to HPV. Also, studies have pointed to hormonal changes during pregnancy as possibly making women more susceptible to HPV infection or cancer growth. Another thought is that pregnant women might have weaker immune systems, allowing for HPV infection and cancer growth.

Being younger than 17 at your first full-term pregnancy

Women who were younger than 17 years when they had their first full-term pregnancy are almost 2 times more likely to get cervical cancer later in life than women who waited to get pregnant until they were 25 years or older.

Poverty

Poverty is also a risk factor for cervical cancer. Many low-income women do not have ready access to adequate health care services, including Pap tests. This means they may not get screened or treated for cervical pre-cancers.

Diethylstilbestrol (DES)

DES is a hormonal drug that was given to some women to prevent miscarriage between 1940 and 1971. Women whose mothers took DES (when pregnant with them) develop clear-cell adenocarcinoma of the vagina or cervix more often than would normally be expected. This type of cancer is extremely rare in women who haven't been exposed to DES. There is about 1 case of this type of cancer in every 1,000 women whose mothers took DES during pregnancy. This means that about 99.9% of "DES daughters" do not develop these cancers.

DES-related clear cell adenocarcinoma is more common in the vagina than the cervix. The risk appears to be greatest in women whose mothers took the drug during their first 16 weeks of pregnancy. The average age of women when they are diagnosed with DES-related clear-cell adenocarcinoma is 19 years. Since the use of DES during pregnancy was stopped by the FDA in 1971, even the youngest DES daughters are older than 35 – past the age of highest risk. Still, there is no age cut-off when these women are safe from DES-related cancer. Doctors do not know exactly how long women will remain at risk.

DES daughters may also be at increased risk of developing squamous cell cancers and pre-cancers of the cervix linked to HPV.

You can learn more about DES in our separate document called *DES Exposure: Questions and Answers*. It can be read on our website, or call to have a free copy sent to you.

Having a family history of cervical cancer

Cervical cancer may run in some families. If your mother or sister had cervical cancer, your chances of developing the disease are 2 to 3 times higher than if no one in the family had it. Some researchers suspect that some instances of this familial tendency are caused by an inherited condition that makes some women less able to fight off HPV infection than others. In other instances, women from the same family as a patient already diagnosed could be more likely to have one or more of the other non-genetic risk factors previously described in this section.

Do we know what causes cervical cancer?

In recent years, scientists have made much progress toward understanding what happens in cells of the cervix when cancer develops. In addition, they have identified several risk factors that increase the odds that a woman might develop cervical cancer (see the previous section).

The development of normal human cells mostly depends on the information contained in the cells' chromosomes. Chromosomes are large molecules of DNA. DNA is the chemical that carries the instructions for nearly everything our cells do. We usually look like our parents because they are the source of our DNA. However, DNA affects more than the way we look.

Some genes (packets of our DNA) have instructions for controlling when our cells grow and divide. Certain genes that promote cell division are called *oncogenes*. Others 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 mutations (gene defects) that turn on oncogenes or turn off tumor suppressor genes.

HPV causes the production of 2 proteins known as E6 and E7 which turn off some tumor suppressor genes. This may allow the cervical lining cells to grow too much and to develop changes in additional genes, which in some cases will lead to cancer.

But HPV does not completely explain what causes cervical cancer. Most women with HPV don't get cervical cancer, and certain other risk factors, like smoking and HIV infection, influence which women exposed to HPV are more likely to develop cervical cancer.

Can cervical cancer be prevented?

The most common form of cervical cancer starts with pre-cancerous changes and there are ways to stop this disease from developing. The first way is to find and treat pre-cancers before they become true cancers, and the second is to prevent the pre-cancers.

Finding cervical pre-cancers

A well-proven way to prevent cervix cancer is to have testing (screening) to find pre-cancers before they can turn into invasive cancer. The Pap test (or Pap smear) and the human papilloma virus (HPV) test are used for this. If a pre-cancer is found it can be treated, stopping cervical cancer before it really starts. Most invasive cervical cancers are found in women who have not had regular Pap tests.

The Pap test (or Pap smear) is a procedure used to collect cells from the cervix so that they can be looked at under a microscope to find cancer and pre-cancer. These cells can also be used for HPV testing. A Pap test can be done during a pelvic exam, but not all pelvic exams include a Pap test.

An HPV test can be done on the same sample of cells collected for the Pap test.

The most important thing you can do to prevent cervical cancer is to be tested according to American Cancer Society guidelines. These can be found in our document *Cervical Cancer Prevention and Early Detection*. This document also has information about the work-up and treatment of women with abnormal Pap test results.

Things to do to prevent pre-cancers

There are also some things you can do to prevent pre-cancers, such as:

- Avoiding exposure to HPV
- Getting an HPV vaccine
- Not smoking

More information about ways to prevent cervical pre-cancer and cancer can be found in our document *Cervical Cancer Prevention and Early Detection*.

You can also find information on preventing HPV infection in our document, *HPV Vaccines*.

Can cervical cancer be found early?

The best way to find cervical cancer early is to have regular screening with a Pap test (which may be combined with a test for human papilloma virus or HPV). As Pap testing became routine in this country during the past half century, finding pre-invasive lesions (pre-cancers) of the cervix became far more common than finding invasive cancer. Being alert to any signs and symptoms of cervical cancer (discussed in the next section) can also help avoid unnecessary delays in diagnosis. Early detection greatly improves the chances of successful treatment and prevents any early cervical cell changes from becoming cancerous.

More information about using the Pap test and the HPV test to find cervical cancer early, including the American Cancer Society's Guidelines for cervical cancer screening can be found in our document *Cervical Cancer Prevention and Early Detection*.

Signs and symptoms of cervical cancer

Women with early cervical cancers and pre-cancers usually have no symptoms. Symptoms often do not begin until the cancer becomes invasive and grows into nearby tissue. When this happens, the most common symptoms are:

- Abnormal vaginal bleeding, such as bleeding after vaginal intercourse, bleeding after menopause, bleeding and spotting between periods, and having (menstrual) periods that are longer or heavier than usual. Bleeding after douching or after a pelvic exam may also occur.
- An unusual discharge from the vagina – the discharge may contain some blood and may occur between your periods or after menopause.
- Pain during intercourse.

These signs and symptoms can also be caused by conditions other than cervical cancer. For example, an infection can cause pain or bleeding. Still, if you have any of these signs or other suspicious symptoms, you should see your health care professional right away. Ignoring symptoms may allow the cancer to progress to a more advanced stage and lower your chance for effective treatment.

Even better, don't wait for symptoms to appear. Have regular Pap tests and pelvic exams.

How is cervical cancer diagnosed?

The first step in finding cervical cancer is often an abnormal Pap test result. This will lead to further tests which can diagnose cervical cancer.

Cervical cancer may also be suspected if you have symptoms like abnormal vaginal bleeding or pain during intercourse. Your primary doctor or gynecologist often can do the tests needed to diagnose pre-cancers and cancers and may also be able to treat a pre-cancer.

If there is a diagnosis of invasive cancer, your doctor should refer you to a gynecologic oncologist, a doctor who specializes in cancers of women's reproductive systems.

Tests for women with symptoms of cervical cancer or abnormal Pap results

Medical history and physical exam

First, the doctor will ask you about your personal and family medical history. This includes information related to risk factors and symptoms of cervical cancer. A complete physical exam will help evaluate your general state of health. The doctor will do a pelvic exam and may do a Pap test if one has not already been done. In addition, your lymph nodes will be checked closely for evidence of metastasis (cancer spread).

The Pap test is a screening test, not a diagnostic test. An abnormal Pap test result may mean more testing, sometimes including tests to see if a cancer or a pre-cancer is actually present. The tests that are used include colposcopy (with biopsy) and endocervical scraping. If a biopsy shows a pre-cancer, doctors will take steps to keep an actual cancer from developing. Treatment of abnormal pap results is discussed in our document *Cervical Cancer Prevention and Early Detection*.

Colposcopy

If you have certain symptoms that suggest cancer or if your Pap test shows abnormal cells, you will need to have a test called *colposcopy*. You will lie on the exam table as you do with a pelvic exam. A speculum will be placed in the vagina to help the doctor see the cervix. The doctor will use a colposcope to examine the cervix. The colposcope is an instrument (that

stays outside the body) that has magnifying lenses (like binoculars). It lets the doctor see the surface of the cervix closely and clearly. The doctor will apply a weak solution of acetic acid (similar to vinegar) to your cervix to make any abnormal areas easier to see.

Colposcopy itself causes no more discomfort than any other speculum exam. It has no side effects and can be done safely even if you are pregnant. Like the Pap test, it is better not to do it during your menstrual period. If an abnormal area is seen on the cervix, a biopsy will be done. For a biopsy, a small piece of tissue is removed from the area that looks abnormal. The sample is sent to a pathologist to look at under a microscope. A biopsy is the only way to tell for certain whether an abnormal area is a pre-cancer, a true cancer, or neither. Although the colposcopy procedure is usually not painful, the cervical biopsy can cause discomfort, cramping, or even pain in some women.

Cervical biopsies

Several types of biopsies can be used to diagnose cervical pre-cancers and cancers. If the biopsy can completely remove all of the abnormal tissue, it might be the only treatment needed.

Colposcopic biopsy

For this type of biopsy, first the cervix is examined with a colposcope to find the abnormal areas. Using a biopsy forceps, a small (about 1/8-inch) section of the abnormal area on the surface of the cervix is removed. The biopsy procedure may cause mild cramping, brief pain, and some slight bleeding afterward. A local anesthetic is sometimes used to numb the cervix before the biopsy.

Endocervical curettage (endocervical scraping)

Sometimes the transformation zone (the area at risk for HPV infection and pre-cancer) cannot be seen with the colposcope and something else must be done to check that area for cancer. This means taking a scraping of the endocervix by inserting a narrow instrument (called a *curette*) into the endocervical canal (the part of the cervix closest to the uterus). The curette is used to scrape the inside of the canal to remove some of the tissue, which is then sent to the laboratory for examination. After this procedure, patients may feel a cramping pain, and they may also have some light bleeding.

Cone biopsy

In this procedure, also known as *conization*, the doctor removes a cone-shaped piece of tissue from the cervix. The base of the cone is formed by the exocervix (outer part of the cervix), and the point or apex of the cone is from the endocervical canal. The tissue removed in the cone includes the transformation zone (the border between the exocervix and endocervix, where cervical pre-cancers and cancers are most likely to start).

A cone biopsy can also be used as a treatment to completely remove many pre-cancers and some very early cancers. Having had a cone biopsy will not prevent most women from

getting pregnant, but if a large amount of tissue has been removed, women may have a higher risk of giving birth prematurely.

The methods commonly used for cone biopsies are the loop electrosurgical excision procedure (LEEP), also called the *large loop excision of the transformation zone* (LLETZ), and the cold knife cone biopsy.

- **Loop electrosurgical procedure (LEEP, LLETZ):** In this method, the tissue is removed with a thin wire loop that is heated by electrical current and acts as a scalpel. For this procedure, a local anesthetic is used, and it can be done in your doctor's office. It takes only about 10 minutes. You might have mild cramping during and after the procedure, and mild-to-moderate bleeding for several weeks.
- **Cold knife cone biopsy:** This method uses a surgical scalpel or a laser instead of a heated wire to remove tissue. You will receive anesthesia during the operation (either a general anesthesia, where you are asleep, or a spinal or epidural anesthesia, where an injection into the area around the spinal cord makes you numb below the waist) and is done in a hospital, but no overnight stay is needed. After the procedure, you might have cramping and some bleeding for a few weeks.

How biopsy results are reported

Pre-cancerous changes in a biopsy are called *cervical intraepithelial neoplasia* (CIN). Sometimes the term *dysplasia* is used instead of CIN. CIN is graded on a scale of 1 to 3 based on how much of the cervical tissue looks abnormal when viewed under the microscope.

- In CIN1, not much of the tissue looks abnormal, and it is considered the least serious cervical pre-cancer (mild dysplasia).
- In CIN2 more of the tissue looks abnormal (moderate dysplasia)
- In CIN3 most of the tissue looks abnormal; CIN3 is the most serious pre-cancer (severe dysplasia) and includes carcinoma in situ).

If a cancer is found on a biopsy, it will be identified as either squamous cell carcinoma or adenocarcinoma.

Diagnostic tests for women with cervical cancer

If a biopsy shows that cancer is present, your doctor may order certain tests to see how far the cancer has spread. Many of the tests described below are not necessary for every patient. Decisions about using these tests are based on the results of the physical exam and biopsy.

Cystoscopy, proctoscopy, and examination under anesthesia

These are most often done in women who have large tumors. They are not necessary if the cancer is caught early.

In cystoscopy a slender tube with a lens and a light is placed into the bladder through the urethra. This lets the doctor check your bladder and urethra to see if cancer is growing into these areas. Biopsy samples can be removed during cystoscopy for pathologic (microscopic) testing. Cystoscopy can be done under a local anesthetic, but some patients may need general anesthesia. Your doctor will let you know what to expect before and after the procedure.

Proctoscopy is a visual inspection of the rectum through a lighted tube to check for spread of cervical cancer into your rectum.

Your doctor may also do a pelvic exam while you are under anesthesia to find out if the cancer has spread beyond the cervix.

Imaging studies

If your doctor finds that you have cervical cancer, certain imaging studies may be done. These include magnetic resonance imaging (MRI) and computed tomography (CT) scans. These studies can show whether the cancer has spread beyond the cervix.

Chest x-ray

Your chest may be x-rayed to see if cancer has spread to your lungs. This is very unlikely unless the cancer is far advanced. If the results are normal, you probably don't have cancer in your lungs.

Computed tomography (CT)

The computed tomography (CT) scan is an x-ray procedure that produces detailed cross-sectional images of your body. Instead of taking one picture, like a conventional x-ray, a CT scanner takes many pictures 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). The machine takes pictures of multiple slices of the part of your body that is being studied. CT scans can help tell if your cancer has spread to the lymph nodes in the abdomen and pelvis. They can also be used to see if the cancer has spread to the liver, lungs, or elsewhere in the body.

A CT scanner has been described as a large donut, with a narrow table in the middle opening. You will need to lie still on the table while the scan is being done. CT scans take longer than regular x-rays, and you might feel a bit confined by the ring while the pictures are being taken.

Before the test you may be asked to drink 1 to 2 pints of a liquid called *oral contrast*. You may also receive an IV (intravenous) line through which a different kind of contrast is injected. This helps better outline structures in your body.

The IV contrast can make you flush (a feeling of warmth with some redness of the skin). A few people are allergic to the dye and can get hives. Rarely, more serious reactions, like trouble breathing and low blood pressure, can occur. You can be given medicine to prevent and treat allergic reactions, so be sure to tell your doctor if you have ever had a reaction to contrast material used for x-rays. It is also important to let your doctor know about any other allergies.

CT scans take longer than regular x-rays and you will need to lie still on a table while they are being done. Also, you might feel a bit confined by the ring-like equipment you're in when the pictures are being taken.

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

Magnetic resonance imaging (MRI)

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

MRI images are particularly useful in examining pelvic tumors. They are also helpful in detecting cancer that has spread to the brain or spinal cord.

A contrast material might be injected into a vein just as with CT scans, but is used less often. MRI scans take longer than CT scans – often up to an hour. Also, you have to be placed inside a tube-like piece of equipment, which is confining and can upset people with claustrophobia (a fear of enclosed spaces). Special, “open” MRI machines that are not so confining may be an option for some patients; the downside of these is that the images may not be as good. The machine also makes a thumping noise that some find disturbing. Some places provide headphones with music to block this noise out. A mild sedative is helpful for some people.

Intravenous urography

Intravenous urography (also known as *intravenous pyelogram*, or IVP) is an x-ray of the urinary system taken after a special dye is injected into a vein. This dye is removed from the bloodstream by the kidneys and passes through the ureters and into the bladder (the ureters are the tubes that connect the kidneys to the bladder). This test finds abnormalities in the urinary tract, such as changes caused by spread of cervical cancer to the pelvic lymph nodes,

which may compress or block a ureter. IVP is rarely used currently to evaluate patients with cervical cancer. You will not usually need an IVP if you have already had a CT or MRI.

Positron emission tomography

Positron emission tomography (PET) scans uses glucose (a form of sugar) that contains a radioactive atom. Cancer cells in the body absorb large amounts of the radioactive sugar and a special camera can detect the radioactivity. This test can help see if the cancer has spread to lymph nodes. PET scans can also be useful if your doctor thinks the cancer has spread but doesn't know where. PET scans can be used instead of other types of x-rays because they scan your whole body. PET scans are often combined with CT scans using a machine that can do both at the same time. The CT/PET test is rarely used for patients with early cervical cancer, but may be used to look for more advanced disease. .

How is cervical cancer staged?

The process of finding out how far the cancer has spread is called *staging*. Information from exams and diagnostic tests is used to determine the size of the tumor, how deeply the tumor has invaded tissues in and around the cervix, and the spread to lymph nodes or distant organs (metastasis). This is an important process because the stage of the cancer is the key factor in selecting the right treatment plan.

The stage of a cancer does not change over time, even if the cancer progresses. A cancer that comes back or spreads is still referred to by the stage it was given when it was first found and diagnosed, only information about the current extent of the cancer is added. A person keeps the same diagnosis stage, but more information is added to the diagnosis to explain the current disease status

A staging system is a way for members of the cancer care team to summarize the extent of a cancer's spread. The 2 systems used for staging most types of cervical cancer, the *FIGO* (International Federation of Gynecology and Obstetrics) system and the AJCC (American Joint Committee on Cancer) TNM staging system, are very similar. Gynecologists and gynecologic oncologists use the FIGO system, but the AJCC system is included here to be complete. The AJCC system classifies cervical cancer on the basis of 3 factors: the extent of the tumor (T), whether the cancer has spread to lymph nodes (N) and whether it has spread to distant sites (M). The FIGO system uses the same information. The system described below is the most recent AJCC system, which went into effect January 2010. Any differences between the AJCC system and the FIGO system are explained in the text.

This system classifies the disease in stages 0 through IV. Staging is based on clinical rather than surgical findings. This means that the extent of disease is evaluated by the doctor's physical examination and a few other tests that are done in some cases, such as cystoscopy and proctoscopy – it is not based on the findings during surgery or on imaging tests.

When surgery is done, it might show that the cancer has spread more than the doctors first thought. This new information could change the treatment plan, but it does not change the patient's stage.

Tumor extent (T)

Tis: The cancer cells are only found on the surface of the cervix (in the layer of cells lining the cervix), without growing into deeper tissues. (Tis is not included in the FIGO system)

T1: The cancer cells have grown from the surface layer of the cervix into deeper tissues of the cervix. The cancer may also be growing into the body of the uterus, but it has not grown outside the uterus.

T1a: There is a very small amount of cancer, and it can be seen only under a microscope.

- **T1a1:** The area of cancer is less than 3 mm (about 1/8-inch) deep and less than 7 mm (about 1/4-inch) wide.
- **T1a2:** The area of cancer invasion is between 3 mm and 5 mm (about 1/5-inch) deep and less than 7 mm (about 1/4-inch) wide.

T1b: This stage includes stage I cancers that can be seen without a microscope. This stage also includes cancers that can only be seen with a microscope if they have spread deeper than 5 mm (about 1/5 inch) into connective tissue of the cervix or are wider than 7 mm.

- **T1b1:** The cancer can be seen but it is not larger than 4 cm (about 1 3/5 inches).
- **T1b2:** The cancer can be seen and is larger than 4 cm.

T2: In this stage, the cancer has grown beyond the cervix and uterus, but hasn't spread to the walls of the pelvis or the lower part of the vagina. The cancer may have grown into the upper part of the vagina.

T2a: The cancer has not spread into the tissues next to the cervix (called the *parametria*).

- **T2a1:** The cancer can be seen but it is not larger than 4 cm (about 1 3/5 inches).
- **T2a2:** The cancer can be seen and is larger than 4 cm.

T2b: The cancer has spread into the tissues next to the cervix (the parametria)

T3: The cancer has spread to the lower part of the vagina or the walls of the pelvis. The cancer may be blocking the ureters (tubes that carry urine from the kidneys to the bladder).

- **T3a:** The cancer has spread to the lower third of the vagina but not to the walls of the pelvis.

- **T3b:** The cancer has grown into the walls of the pelvis and/or is blocking one or both ureters (this is called *hydronephrosis*).

T4: The cancer has spread to the bladder or rectum or it is growing out of the pelvis

Lymph node spread (N)

NX: The nearby lymph nodes cannot be assessed

N0: No spread to nearby lymph nodes

N1: The cancer has spread to nearby lymph nodes

Distant spread (M)

M0: The cancer has not spread to distant lymph nodes, organs, or tissues

M1: The cancer has spread to distant organs (such as the lungs or liver), to lymph nodes in the chest or neck, and/or to the peritoneum (the tissue coating the inside of the abdomen).

Stage grouping and FIGO stages

Information about the tumor, lymph nodes, and any cancer spread is then combined to assign the stage of disease. This process is called *stage grouping*. The stages are described using the number 0 and Roman numerals from I to IV. Some stages are divided into sub-stages indicated by letters and numbers. FIGO stages are the same as AJCC stages, except that FIGO staging doesn't include the lymph nodes until stage III. In addition, stage 0 doesn't exist in the FIGO system.

Stage 0 (Tis, N0, M0): The cancer cells are only in the cells on the surface of the cervix (the layer of cells lining the cervix), without growing into (invading) deeper tissues of the cervix. This stage is also called *carcinoma in situ* (CIS) which is part of cervical intraepithelial neoplasia grade 3 (CIN3). Stage 0 is not included in the FIGO system.

Stage I (T1, N0, M0): In this stage the cancer has grown into (invaded) the cervix, but it is not growing outside the uterus. The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0).

Stage IA (T1a, N0, M0): This is the earliest form of stage I. There is a very small amount of cancer, and it can be seen only under a microscope.

The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0).

- **Stage IA1 (T1a1, N0, M0):** The cancer is less than 3 mm (about 1/8-inch) deep and less than 7 mm (about 1/4-inch) wide. The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0).

- **Stage IA2 (T1a2, N0, M0):** The cancer is between 3 mm and 5 mm (about 1/5-inch) deep and less than 7 mm (about 1/4-inch) wide. The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0).

Stage IB (T1b, N0, M0): This includes stage I cancers that can be seen without a microscope as well as cancers that can only be seen with a microscope if they have spread deeper than 5 mm (about 1/5 inch) into connective tissue of the cervix or are wider than 7 mm. These cancers have not spread to nearby lymph nodes (N0) or distant sites (M0).

- **Stage IB1 (T1b1, N0, M0):** The cancer can be seen but it is not larger than 4 cm (about 1 3/5 inches). It has not spread to nearby lymph nodes (N0) or distant sites (M0).
- **Stage IB2 (T1b2, N0, M0):** The cancer can be seen and is larger than 4 cm. It has not spread to nearby lymph nodes (N0) or distant sites (M0).

Stage II (T2, N0, M0): In this stage, the cancer has grown beyond the cervix and uterus, but hasn't spread to the walls of the pelvis or the lower part of the vagina.

Stage IIA (T2a, N0, M0): The cancer has not spread into the tissues next to the cervix (called *the parametria*). The cancer may have grown into the upper part of the vagina. It has not spread to nearby lymph nodes (N0) or distant sites (M0).

- **Stage IIA1 (T2a1, N0, M0):** The cancer can be seen but it is not larger than 4 cm (about 1 3/5 inches). It has not spread to nearby lymph nodes (N0) or distant sites (M0).
- **Stage IIA2 (T2a2, N0, M0):** The cancer can be seen and is larger than 4 cm.
- **Stage IIB (T2b, N0, M0):** The cancer has spread into the tissues next to the cervix (*the parametria*).

Stage III (T3, N0, M0): The cancer has spread to the lower part of the vagina or the walls of the pelvis. The cancer may be blocking the ureters (tubes that carry urine from the kidneys to the bladder). It has not spread to nearby lymph nodes (N0) or distant sites (M0).

- **Stage IIIA (T3a, N0, M0):** The cancer has spread to the lower third of the vagina but not to the walls of the pelvis. It has not spread to nearby lymph nodes (N0) or distant sites (M0).
- **Stage IIIB (T3b, N0, M0; OR T1-T3, N1, M0):** either:
 - The cancer has grown into the walls of the pelvis and/or has blocked one or both ureters (a condition called *hydronephrosis*),
 - OR
 - The cancer has spread to lymph nodes in the pelvis (N1) but not to distant sites (M0). The tumor can be any size and may have spread to the lower part of the vagina or walls of the pelvis (T1 to T3).

Stage IV: This is the most advanced stage of cervical cancer. The cancer has spread to nearby organs or other parts of the body.

- **Stage IVA (T4, N0, M0):** The cancer has spread to the bladder or rectum, which are organs close to the cervix (T4). It has not spread to nearby lymph nodes (N0) or distant sites (M0).
- **Stage IVB (any T, any N, M1):** The cancer has spread to distant organs beyond the pelvic area, such as the lungs or liver.

Survival rates for cervical 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. If you do not want to know them, stop reading here and skip to the next section.

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). Also, these are observed survival rates and include deaths from any cause. People with cancer may die from things other than cancer, and these rates don't take that into account.

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 cervical 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. Many other factors can affect a person's outlook, such as their general health 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 rates below are based on the stage of the cancer *at the time of diagnosis*. Your doctor can give you information about what kind of survival you may be able to expect if your cancer has come back or progressed.

The rates below were published in 2010 in the 7th edition of the AJCC staging manual. They are based on data collected by the National Cancer Data Base from people diagnosed between 2000 and 2002. These are the most recent statistics available for survival by the current staging system.

Stage	5-Year Observed Survival Rate
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0	93%
IA	93%
IB	80%
IIA	63%
IIB	58%
IIIA	35%
IIIB	32%
IVA	16%
IVB	15%

How is cervical 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

The options for treating each patient with cervical cancer depend on the stage of disease. The stage of a cervical cancer describes its size, depth of invasion (how far it has grown into the cervix), and how far it has spread.

After establishing the stage of your cervical cancer, your cancer care team will recommend your treatment options. Think about your options without feeling rushed. If there is anything you do not understand, ask for an explanation. Although the choice of treatment depends largely on the stage of the disease at the time of diagnosis, other factors that may influence your options are your age, your general health, your individual circumstances, and your preferences. Cervical cancer can affect your sex life and your ability to have children. These concerns should also be considered as you make treatment decisions. (See *Sexuality for the*

Woman With Cancer to learn more about these issues.) Be sure that you understand all the risks and side effects of the various treatments before making a decision.

Depending on the type and stage of your cancer, you may need more than one type of treatment. Doctors on your cancer treatment team may include:

- A gynecologist: a doctor who treats diseases of the female reproductive system
- A gynecologic oncologist: a doctor who specializes in cancers of the female reproductive system
- A radiation oncologist: a doctor who uses radiation to treat cancer
- A medical oncologist: a doctor who uses chemotherapy and other medicines to treat cancer

Many other specialists may be involved in your care as well, including nurse practitioners, nurses, psychologists, social workers, rehabilitation specialists, and other health professionals.

Common types of treatments for cervical cancer include:

- Surgery
- Radiation therapy
- Chemotherapy (chemo)
- Targeted-therapy

For the earliest stages of cervical cancer, either surgery or radiation combined with chemo may be used. For later stages, radiation combined with chemo is usually the main treatment. Chemo (by itself) is often used to treat advanced cervical cancer.

It is often a good idea to get a second opinion, especially from doctors experienced in treating cervical cancer. A second opinion can give you more information and help you feel more confident about choosing a treatment plan. Some insurance companies require a second opinion before they will agree to pay for certain treatments. Almost all will pay for a second opinion. Still, you might want to check your coverage first, so you'll know if you will have to pay for it.

It is important to discuss all of your treatment options, including their goals and possible side effects, with your doctors to help make the decisions that best fit your needs. It's also very important to ask questions if there's anything you're not sure about. You can find some good questions to ask in the section, "What should you ask your doctor about cervical cancer?"

Your recovery is the goal of your cancer care team. If a cure is not possible, the goal may be to remove or destroy as much of the cancer as possible to help you live longer and feel better. Sometimes treatment is aimed at relieving symptoms. This is called *palliative treatment*.

Surgery for cervical cancer

Cryosurgery

A metal probe cooled with liquid nitrogen is placed directly on the cervix. This kills the abnormal cells by freezing them. This can be done in a doctor's office or clinic. After cryosurgery, you may have a lot of watery brown discharge for a few weeks.

Cryosurgery is used to treat carcinoma in situ of the cervix (stage 0), but not invasive cancer.

Laser surgery

A focused laser beam, directed through the vagina, is used to vaporize (burn off) abnormal cells or to remove a small piece of tissue for study. This can be done in a doctor's office or clinic and is done under local anesthesia (numbing medicine).

Laser surgery is used to treat carcinoma in situ of the cervix (stage 0). It is not used to treat invasive cancer.

Conization

A cone-shaped piece of tissue is removed from the cervix. This is done using a surgical or laser knife (cold knife cone biopsy) or using a thin wire heated by electricity (the loop electrosurgical, LEEP or LEETZ procedure). (See the section, "How are cervical cancers and pre-cancers diagnosed?" for more information.) After the procedure, the tissue removed (the cone) is examined under the microscope. If the margins (outer edges) of the cone contain cancer (or pre-cancer) cells (called *positive margins*), some cancer (or pre-cancer) may have been left behind, so further treatment is needed.

A cone biopsy may be used to diagnose the cancer before additional treatment with surgery or radiation. It can also be used as the only treatment in women with early (stage IA1) cancer who want to preserve their ability to have children (fertility).

Hysterectomy

This is surgery to remove the uterus (both the body of the uterus and the cervix) but not the structures next to the uterus (parametria and uterosacral ligaments). The vagina and pelvic lymph nodes are not removed. The ovaries and fallopian tubes are usually left in place unless there is another reason to remove them.

When the uterus is removed through a surgical incision in the front of the abdomen, it is called an *abdominal hysterectomy*. When the uterus is removed through the vagina, it is called a *vaginal hysterectomy*. When the uterus is removed using laparoscopy, it is called a *laparoscopic hysterectomy*. Laparoscopy allows the inside of the abdomen and pelvis to be seen through a thin tube with a camera at the end (the laparoscope) that is inserted into one or

more very small surgical incisions. Small instruments can be controlled through the tube, so the surgeon makes cuts and removes tissue through the tubes without making a large cut in the abdomen. The laparoscope can also make it easier for the doctor to remove the uterus, ovaries, and fallopian tubes through the vaginal incision. This is called a *laparoscopic assisted vaginal hysterectomy*. In some cases, laparoscopy is performed with special tools to help the surgeon see better and with instruments that are controlled by the surgeon. This is called *robotic-assisted surgery*.

General or epidural (regional) anesthesia is used for all of these operations. The recovery time and hospital stay tends to be shorter for a laparoscopic or vaginal hysterectomy than for an abdominal hysterectomy. For a laparoscopic or vaginal hysterectomy, the hospital stay is usually 1 to 2 days followed by a 2- to 3-week recovery period. A hospital stay of 3 to 5 days is common for an abdominal hysterectomy, and complete recovery takes about 4 to 6 weeks. Any type of hysterectomy results in infertility (inability to have children). Complications are unusual but could include excessive bleeding, wound infection, or damage to the urinary or intestinal systems.

Hysterectomy is used to treat stage IA1 cervical cancers. It is also used for some stage 0 cancers (carcinoma in situ), if cancer cells were found at the edges of the cone biopsy (this is called *positive margins*). A hysterectomy is also used to treat some non-cancerous conditions. The most common of these is leiomyomas, a type of benign tumor commonly known as fibroids.

Sexual impact of hysterectomy: Hysterectomy does not change a woman's ability to feel sexual pleasure. A woman does not need a uterus or cervix to reach orgasm. The area around the clitoris and the lining of the vagina remain as sensitive as before after a hysterectomy. More information about managing the sexual side effects of cervical cancer treatment can be found in our document *Sexuality for the Woman with Cancer*.

Radical hysterectomy

For this operation, the surgeon removes the uterus along with the tissues next to the uterus (the *parametria* and the *uterosacral ligaments*) and the upper part (about 1 inch) of the vagina next to the cervix. The ovaries and fallopian tubes are not removed unless there is some other medical reason to do so. This surgery is usually performed through an abdominal incision. Often, some pelvic lymph nodes are removed as well (this procedure, known as *lymph node dissection*, is discussed later in this section).

Another surgical approach is called *laparoscopic-assisted radical vaginal hysterectomy*. This operation combines a radical vaginal hysterectomy with a laparoscopic pelvic node dissection. Laparoscopy allows the inside of the abdomen and pelvis to be seen through a thin tube with a camera at the end (the laparoscope) that is inserted into one or more very small surgical incisions. Small instruments can be controlled through the tube, so the surgeon can make cuts and remove tissue through the tubes without making a large cut in the abdomen. The laparoscope can make it easier for the doctor to remove the uterus, ovaries,

and fallopian tubes through the vaginal incision. Laparoscopy can also be used to perform a radical hysterectomy through the abdomen. Lymph nodes are removed as well. This is called *laparoscopically assisted radical hysterectomy with lymphadenectomy*.

Robot-assisted laparoscopic surgery is also sometimes used to perform radical hysterectomies. The advantages are lower blood loss and a shorter stay in the hospital after surgery (compared to surgery using regular incisions). However, this way of treating cervical cancer is still relatively new, and its ultimate role in treatment is still being studied.

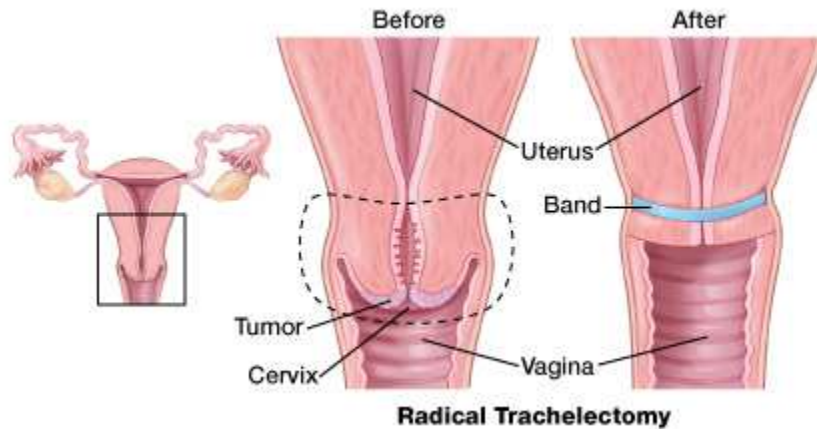
More tissue is removed in a radical hysterectomy than in a simple one, so the hospital stay can be longer, about 5 to 7 days. Because the uterus is removed, this surgery results in infertility. Because some of the nerves to the bladder are removed, some women have problems emptying their bladder after this operation and may need a catheter for a time. Complications are unusual but could include excessive bleeding, wound infection, or damage to the urinary and intestinal systems.

A radical hysterectomy and pelvic lymph node dissection are the usual treatment for stages IA2, IB, and less commonly IIA cervical cancer, especially in young women.

Sexual impact of radical hysterectomy: Radical hysterectomy does not change a woman's ability to feel sexual pleasure. Although the vagina is shortened, the area around the clitoris and the lining of the vagina is as sensitive as before. A woman does not need a uterus or cervix to reach orgasm. When cancer has caused pain or bleeding with intercourse, the hysterectomy may actually improve a woman's sex life by stopping these symptoms. More information about managing the sexual side effects of cervical cancer treatment can be found in our document *Sexuality for the Woman with Cancer*.

Trachelectomy

Most women with stage IA2 and stage IB cervical cancer are treated with hysterectomy. Another procedure, known as a *radical trachelectomy*, allows women be treated without losing their ability to have children. This procedure removes the cervix and the upper part of the vagina but not the body of the uterus. The surgeon places a "purse-string" stitch to act as an artificial opening of the cervix inside the uterine cavity.



The nearby lymph nodes are also removed using laparoscopy which may require another incision (cut). The operation is done either through the vagina or the abdomen.

After trachelectomy, some women are able to carry a pregnancy to term and deliver a healthy baby by cesarean section. In one study, the pregnancy rate after 5 years was more than 50%, but the women who had this surgery had a higher risk of miscarriage than what is seen in normal healthy women. The risk of the cancer coming back after this procedure is low.

Pelvic exenteration

This is a more extensive operation that may be used to treat recurrent cervical cancer. In this surgery, all of the same organs and tissues are removed as in a radical hysterectomy with pelvic lymph node dissection (lymph node dissection is discussed in the next section). In addition, the bladder, vagina, rectum, and part of the colon may also be removed, depending on where the cancer has spread.

If the bladder is removed, a new way to store and eliminate urine will be needed. This usually means using a short segment of intestine to function as a new bladder. The new bladder may be connected to the abdominal wall so that urine is drained periodically when the patient places a catheter into a urostomy (a small opening). Or urine may drain continuously into a small plastic bag attached to the front of the abdomen. For more information about urostomies, see our document called *Urostomy: A Guide*.

If the rectum and part of the colon are removed, a new way to eliminate solid waste must be created. This is done by attaching the remaining intestine to the abdominal wall so that fecal material can pass through a colostomy (a small opening) into a small plastic bag worn on the front of the abdomen (more information about colostomies can be found in our document, *Colostomy: A Guide*). It may be possible to remove the cancerous part of the colon (next to the cervix) and reconnect the colon ends so that no bags or external appliances are needed.

If the vagina is removed, a new vagina can be surgically created out of skin, intestinal tissue, or muscle and skin (*myocutaneous*) grafts.

Sexual impact of pelvic exenteration: Recovery from total pelvic exenteration takes a long time. Most women don't begin to feel like themselves again for 6 months after surgery. Some say it takes a year or two to adjust completely.

Nevertheless, these women can lead happy and productive lives. With practice and determination, they can also have sexual desire, pleasure, and orgasms.

More information about managing the sexual side effects of cervical cancer treatment can be found in our document *Sexuality for the Woman with Cancer*.

Pelvic lymph node dissection

Cancer that starts in the cervix can spread to lymph nodes in the pelvis (lymph nodes are pea-sized collections of immune system tissue). To check for lymph node spread, the surgeon might remove some of these lymph nodes. This procedure is known as a *lymph node dissection* or *lymph node sampling*. It is done at the same time as a hysterectomy (or trachelectomy). Removing lymph nodes can lead to fluid drainage problems in the leg. This can cause severe swelling in the leg, a condition called *lymphedema*. More information about lymphedema can be found in our document, *Understanding Lymphedema – For Cancers Other Than Breast Cancer*.

Radiation therapy for cervical cancer

Radiation therapy uses high energy x-rays or particles to kill cancer cells.

External beam radiation

One way to give radiation is to aim x-rays at the cancer from outside the body. This is called *external beam radiation therapy (EBRT)*. Treatment is much like getting a regular x-ray, but the radiation dose is stronger. Each treatment lasts only a few minutes, although the setup time – getting you into place for treatment – usually takes longer. The procedure itself is painless, but does result in some side effects.

When radiation is used as the main treatment for cervical cancer, EBRT is usually combined with chemotherapy (called *concurrent chemoradiation*). Often, this is a low dose of a drug called *cisplatin*, but other chemotherapy drugs can be used as well. The radiation treatments are given 5 days a week for 6 to 7 weeks to complete.

EBRT can also be used by itself to treat areas of cancer spread or as the main treatment of cervical cancer in patients who can't tolerate chemoradiation.

Common side effects of external beam radiation therapy include:

- Fatigue (tiredness)
- Upset stomach

- Diarrhea or loose stools (if radiation is given to the pelvis or abdomen)
- Nausea and vomiting
- Skin changes

Skin changes are common. As the radiation passes through the skin to the cancer, it can damage the skin cells. This can cause irritation ranging from mild, temporary redness to peeling. The skin may release fluid, which can lead to infection, so the area exposed to radiation must be carefully cleaned and protected.

Radiation to the pelvis can also irritate the bladder (radiation cystitis), causing discomfort and an urge to urinate often.

Radiation can affect the vulva and vagina, making them sensitive and sore, and sometimes causing a discharge.

Pelvic radiation can also affect the ovaries, leading to menstrual changes and even early menopause

Radiation can also lead to low blood counts, which can cause:

- Anemia (low red blood cells), which can cause you to feel tired
- Leukopenia (low white blood cells), which increases the risks of serious infection

These side effects improve in the weeks after radiation is stopped.

The blood counts tend to be lower when chemotherapy is given with radiation and fatigue and nausea also tend to be worse.

Brachytherapy

Another type of radiation therapy is called *brachytherapy*, or internal radiation therapy. This involves placing a source of radiation in or near the cancer. For the type of brachytherapy that is used most often to treat cervical cancer, *intracavitary brachytherapy*, the radiation source is placed in a device that is in the vagina (and sometimes the cervix). This is often used in addition to EBRT as a part of the main treatment for cervical cancer.

To treat cervical cancer in women who have had a hysterectomy, the radioactive material is placed in a cylinder in the vagina.

To treat a woman who still has a uterus, the radioactive material can be placed in a small metal tube called a *tandem* that goes in the uterus, along with small round metal holders called *ovoids* placed near the cervix. This is sometimes called *tandem and ovoid treatment*. Another option is called *tandem and ring*. For this, a round holder (like a disc) is placed close to the uterus. Which one is used depends on what type of brachytherapy is planned.

Low-dose rate brachytherapy is completed in just a few days. During that time, the patient remains in bed the hospital with instruments holding the radioactive material in place.

High-dose rate brachytherapy is done as an outpatient over several treatments (often at least a week apart). For each high-dose treatment, the radioactive material is inserted for a few minutes and then removed. The advantage of high-dose rate treatment is that you do not have to stay still for long periods of time.

In brachytherapy, radiation only travels a short distance, so the main effects of the radiation are on the cervix and the walls of the vagina. The most common side effect is irritation of the vagina. It may become red and sore and there may be a discharge. The vulva may become irritated as well. Brachytherapy can also cause many of the same side effects as external beam radiation, such as fatigue, diarrhea, nausea, irritation of the bladder, and low blood counts. Often brachytherapy is given right after external beam radiation (before the side effects can go away), so it can be hard to know which type of treatment is causing the side effect.

Long-term side effects of radiation therapy

Both external beam radiation to the pelvis and brachytherapy can cause scar tissue to form in the vagina. The scar tissue can make the vagina more narrow (called *vaginal stenosis*), less able to stretch, or even shorter, which can make vaginal intercourse painful. A woman can help prevent this problem by stretching the walls of her vagina several times a week.

Although this can be done by having sexual intercourse 3 to 4 times a week, most women find that hard to do during (or in the weeks after) treatment. The other way to stretch out the walls of the vagina is by using a vaginal dilator (a plastic or rubber tube used to stretch out the vagina). A woman getting radiation does not have to start using the dilator during the weeks that radiation is being given, but she should start by 2 to 4 weeks after treatment ends. Because it can take a long time to see the effects of radiation and because the radiation effects are long lasting, it is recommended that the dilator be used indefinitely.

Vaginal dryness and painful intercourse can be long-term side effects from radiation (both brachytherapy and external beam radiation). Vaginal (local) estrogens may help with vaginal dryness and changes to the vaginal lining, especially if radiation to the pelvis damaged the ovaries, causing early menopause. More information about managing the sexual side effects of cervical cancer treatment can be found in our document *Sexuality for the Woman with Cancer*.

Radiation to the pelvis can also weaken the bones, leading to fractures. Hip fractures are the most common, and might occur 2 to 4 years after radiation. Bone density studies are recommended.

If pelvic lymph nodes are treated with radiation, it can lead to fluid drainage problems in the leg. This can cause severe swelling in the leg, a condition called *lymphedema*. More information about lymphedema can be found in our document, *Understanding Lymphedema – For Cancers Other Than Breast Cancer*.

If you are having side effects from radiation treatment, discuss them with your cancer care team.

It is important to know that smoking increases the side effects from radiation and can make treatment less effective. If you smoke, you should stop.

For more information, please see the Radiation Therapy section of our website or our document *Understanding Radiation Therapy: A Guide for Patients and Families*.

The section, “Additional resources for cervical cancer” lists other documents that can help dealing with the side effects of radiation.

Chemotherapy for cervical cancer

Systemic chemotherapy (chemo) uses anti-cancer drugs that are injected into a vein or given by mouth. These drugs enter the bloodstream and can reach all areas of the body, making this treatment useful for killing cancer cells in most parts of the body. Chemo is often given in cycles, with each period of treatment followed by a recovery period.

When is chemotherapy used?

There are a few situations in which chemo may be recommended.

As a part of the main treatment: For some stages of cervical cancer, the preferred treatment is radiation and chemo given together (called *concurrent chemoradiation*). The chemo helps the radiation work better. Options for concurrent chemoradiation include:

- Cisplatin given weekly during radiation. This drug is given into a vein (IV) about 4 hours before the radiation appointment.
- Cisplatin plus 5-fluorouracil (5-FU) given every 4 weeks during radiation.

Sometimes chemo is also given (without radiation) before and/or after chemoradiation.

To treat cervical cancer that has come back after treatment or has spread: Chemo may also be used to treat cancers that have spread to other organs and tissues. It can also be helpful when cancer comes back after treatment with chemoradiation.

Drugs most often used to treat advanced cervical cancer include:

- Cisplatin
- Carboplatin
- Paclitaxel (Taxol[®]),
- Topotecan

- Gemcitabine (Gemzar[®])

Often combinations of these are used.

Some other drugs can be used as well, such as docetaxel (Taxotere[®]), ifosfamide (Ifex[®]), 5-fluorouracil (5-FU), irinotecan (Camptosar[®], CPT-11), and mitomycin.

The targeted drug bevacizumab (Avastin[®]) may be added to chemo. This is discussed in the section about targeted therapy.

Side effects

Chemotherapy drugs kill cancer cells but also damage some normal cells, which can lead to certain side effects. Side effects depend on the type of drugs, the amount taken, and the length of time you are treated. Common side effects of chemotherapy can include:

- Nausea and vomiting
- Loss of appetite
- Loss of hair
- Mouth sores
- Fatigue (tiredness)

Because chemotherapy can damage the blood-producing cells of the bone marrow, the blood cell counts might become low. This can result in:

- An increased chance of infection (from a shortage of white blood cells)
- Bleeding or bruising after minor cuts or injuries (because of a shortage of blood platelets)
- Shortness of breath (due to low red blood cell counts)

When chemo is given with radiation, the side effects are often more severe. The nausea and fatigue are often worse. Diarrhea can also be a problem if chemo is given at the same time as radiation. Problems with low blood counts can also be worse. Your health care team will watch for side effects and can give you medicines to prevent them or help you feel better.

Menstrual changes: For younger women who have not had their uterus removed as a part of treatment, changes in menstrual periods are a common side effect of chemo. Even if your periods stop while you are on chemo, you might still be able to get pregnant. Getting pregnant while receiving chemo could lead to birth defects and interfere with treatment. This is why it's important that women who are pre-menopausal before treatment and are sexually active discuss using birth control with their doctor. Patients who have finished treatment (like chemo) can safely go on to have children, but it's not safe to get pregnant while on treatment.

Premature menopause (not having any more menstrual periods) and infertility (not being able to become pregnant) may occur and may be permanent. Some chemo drugs are more likely to do this than others. The older a woman is when she receives chemo, the more likely it is that she will become infertile or go through menopause as a result. When this happens, there is an increased risk of bone loss and osteoporosis. There are medicines that can treat or help prevent problems with bone loss.

Neuropathy: Some drugs used to treat cervical cancer, including paclitaxel and cisplatin, damage nerves outside of the brain and spinal cord. This (called peripheral neuropathy) can sometimes lead to symptoms (mainly in the hands and feet) like numbness, pain, burning or tingling sensations, sensitivity to cold or heat, or weakness. In most cases this gets better or even goes away once treatment is stopped, but it might last a long time in some women.

Increased risk of leukemia: Very rarely, certain chemo drugs can permanently damage the bone marrow, leading to blood cancers like *myelodysplastic syndromes* or even *acute myeloid leukemia*. If this is going to happen, it is usually within 10 years after treatment. In most women, the benefits of chemo in treating the cancer are likely to far exceed the risk of this serious but rare complication.

Other side effects are also possible. Some of these are more common with certain chemo drugs. Your cancer care team will tell you about the possible side effects of the specific drugs you are getting.

Many side effects are short-term and go away after treatment is finished, but some can last a long time or even be permanent. It's important to tell your health care team if you have any side effects, as there are often ways to lessen them. For example, you can be given drugs to help prevent or reduce nausea and vomiting.

For more information, please see the Chemotherapy section of our website, or our document *A Guide to Chemotherapy*.

The section called “Additional resources for cervical cancer” also has a list of some documents about dealing with common side effects.

Targeted therapy for cervical cancer

As researchers have learned more about the changes in cancer cells, they have been able to develop newer drugs that specifically target these changes. These targeted drugs work differently from standard chemotherapy (chemo) drugs and often have different side effects.

For tumors to grow, they must form new blood vessels to keep them nourished. This process is called *angiogenesis*. Some targeted drugs block this new blood vessel growth and are called *angiogenesis inhibitors*.

Bevacizumab (Avastin[®]) is an angiogenesis inhibitor that can be used to treat advanced cervical cancer. It is a monoclonal antibody (a man-made version of a specific immune

system protein) that targets vascular endothelial growth factor (VEGF), a protein that helps new blood vessels to form.

This drug is often used with chemo for a time. Then if the cancer responds, the chemo may be stopped and the bevacizumab given by itself until the cancer starts growing again.

The possible side effects of this drug are different from (and may add to) those of chemotherapy drugs. Some of these effects can be serious and include problems with bleeding, blood clots, and wound healing. A rare but serious side effect is the formation of an abnormal connection (called a *fistula*) between the vagina and part of the colon or intestine.

This drug is also being studied as a part of the treatment for earlier stage disease.

Our document *Targeted Therapy* has more information about the different kinds of drugs considered targeted therapy.

Clinical trials for cervical cancer

You may have had to make a lot of important 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 might 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 them. 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 website at clinicaltrials.cancer.org/. 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 website at www.cancer.gov.

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

Clinical trials are one way to get state-of-the-art cancer treatment. In some cases they may be the only way to get access to newer treatments. They are also 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 website or call our toll-free number (1-800-227-2345) and have it sent to you.

Complementary and alternative therapies for cervical 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 social media groups and websites might 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 could 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?
- Tell 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. You can also check them out on the *Complementary and Alternative Medicine* page of our website.

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 options for cervical cancer, by stage

The stage of a cervical cancer is the most important factor in choosing treatment. However, other factors that affect this decision include the exact location of the cancer within the cervix, the type of cancer (squamous cell or adenocarcinoma), your age, your overall physical condition, and whether you want to have children.

Stage 0 (carcinoma in situ)

Although the AJCC staging system classifies carcinoma in situ (CIS) as the earliest form of cancer, doctors often think of it as a pre-cancer. That is because the cancer cells in CIS are only in the surface layer of the cervix – they have not grown into deeper layers of cells.

Treatment options for squamous cell carcinoma in situ include cryosurgery, laser surgery, loop electrosurgical excision procedure (LEEP/LEETZ), and cold knife conization.

For adenocarcinoma in situ, hysterectomy is usually recommended. For women who wish to have children, treatment with a cone biopsy may be an option. The cone specimen must have no cancer cells at the edges, and the patient must be closely watched. After the woman has finished having children, a hysterectomy is recommended.

A simple hysterectomy is also an option for treatment of squamous cell carcinoma in situ, and might be done if it returns after other treatments. All cases of CIS can be cured with appropriate treatment. However, pre-cancerous changes can recur (come back) in the cervix or vagina, so it is very important for your doctor to watch you closely. This includes follow-up with regular Pap tests and in some instances with colposcopy.

For information about work-up and treatment of abnormal Pap test results and cervical pre-cancers other than CIS, see our document *Cervical Cancer Prevention and Early Detection*.

Stage IA1

Treatment for this stage depends on whether or not you want to continue to be able to have children (maintain fertility) and whether or not the cancer has grown into blood or lymph vessels (called *lymphovascular invasion*).

Women who want to maintain fertility are often treated first with a cone biopsy to remove the cancer. If the edges of the cone don't contain cancer cells (called *negative margins*), they can be watched closely without further treatment as long as the cancer doesn't come back.

If the edges of the cone biopsy have cancer cells (called *positive margins*), then cancer may have been left behind. This can be treated with a repeat cone biopsy or a radical trachelectomy (removal of the cervix and upper vagina). A radical trachelectomy is preferred if the cancer shows lymphovascular invasion.

Women who don't want to maintain fertility can be treated with a hysterectomy. If the cancer has invaded the blood vessels or lymph vessels (lymphovascular invasion), you might need a radical hysterectomy along with removal of the pelvic lymph nodes.

Stage IA2

Treatment for this stage depends in part on whether or not you want to continue to be able to have children (maintain fertility).

For women who want to maintain fertility, the main treatment is radical trachelectomy with removal of pelvic lymph nodes (pelvic lymph node dissection). Another option is cone biopsy and pelvic lymph node dissection, followed by observation.

Women who don't want to maintain fertility have 2 main options:

- Radical hysterectomy along with removal of lymph nodes in the pelvis (pelvic lymph node dissection)
- External beam radiation therapy to the pelvis plus brachytherapy

If cancer is found in any pelvic lymph nodes during surgery, some of the lymph nodes that lie along the aorta (the large artery in the abdomen) may be removed as well. Any tissue removed at surgery will be examined in the laboratory to see if the cancer has spread further than expected. If the cancer has spread to the tissues next to the uterus (called the *parametria*) or to any lymph nodes, radiation therapy is usually recommended. Often chemotherapy will be given with radiation therapy. If the pathology report says that the tissue removed has *positive margins*, this means that cancer cells are present in the edges of the tissue, and so some cancer might have been left behind. This is also treated with pelvic radiation (given with cisplatin chemotherapy). The doctor may advise brachytherapy, as well.

Stages IB and IIA

The main treatment options are surgery, radiation, or radiation given with chemo (concurrent chemoradiation).

Stage IB1 and IIA1

The standard treatment is a radical hysterectomy with removal of lymph nodes in the pelvis (pelvic lymph node dissection). Some lymph nodes from higher up in the abdomen (called para-aortic lymph nodes) may also be removed to see if the cancer has spread there. Radical trachelectomy may be recommended instead of a radical hysterectomy if the patient still wants to be able to have children.

Another option is to treat with radiation using both brachytherapy and external beam radiation therapy. Chemotherapy (chemo) may be given with the radiation (concurrent chemoradiation).

Stage IB2 and IIA2

The standard treatment is chemo given with radiation therapy. The chemo may be cisplatin or cisplatin plus fluorouracil. The radiation therapy includes both external beam radiation and brachytherapy.

Another choice is radical hysterectomy with removal of pelvic lymph nodes (pelvic lymph node dissection). If cancer cells are found in the removed lymph nodes, or in the edges of the tissue removed (positive margins), surgery may be followed by radiation therapy, which is often given with chemo (concurrent chemoradiation).

Some doctors recommend radiation given with chemotherapy (first option) followed by a hysterectomy.

Stage IIB, III and IVA

Radiation therapy given with chemo (concurrent chemoradiation) is the recommended treatment. The chemo is either cisplatin or cisplatin plus fluorouracil (5-FU). The radiation includes both external beam radiation and brachytherapy.

If cancer has spread to the lymph nodes (especially those in the upper part of the abdomen) it can be a sign that the cancer has spread to other areas in the body. Some experts recommend checking the lymph nodes for cancer before giving radiation. One way to do this is by surgery. Another way is to do an imaging study (like MRI or PET/CT) to look at the lymph nodes. Lymph nodes that are bigger than usual and/or light up on PET are more likely to have cancer. Those lymph nodes can be biopsied to see if they contain cancer. If lymph nodes in the upper part of the abdomen (the para-aortic lymph nodes) are cancerous, doctors might want to do other tests to see if the cancer has spread to other parts of the body.

Stage IVB

At this stage, the cancer has spread out of the pelvis to other areas of the body. Stage IVB cervical cancer is not usually considered curable. Treatment options include radiation therapy to relieve the symptoms of cancer that has spread to the areas near the cervix or to distant sites (such as the lungs or bone). Chemo is often recommended. Most standard regimens use a platinum compound (such as cisplatin or carboplatin) along with another drug such as paclitaxel (Taxol), gemcitabine (Gemzar), or topotecan. The targeted drug bevacizumab (Avastin) may be added to chemo. Clinical trials are testing other combinations of chemo drugs, as well as some other experimental treatments.

Recurrent cervical cancer

Cancer that comes back after treatment is called *recurrent cancer*. Cancer can come back locally (in or near where it first started, such as cervix, uterus or nearby the pelvic organs) or come back in distant areas (spread through the lymphatic system and/or the bloodstream to organs such as the lungs or bone).

If the cancer has recurred in the pelvis only, extensive surgery (by pelvic exenteration) may be an option for some patients. This operation may successfully treat 40% to 50% of patients. (See the discussion in the section about surgery) Sometimes radiation or chemo may be used to help relieve symptoms, but they aren't expected to cure the cancer.

If chemo is used, you should understand the goals and limitations of this therapy. Sometimes chemo can improve your quality of life, and other times it can diminish it. You need to discuss this with your doctors.

New treatments that may benefit patients with distant recurrence of cervical cancer are being evaluated in clinical trials. You may want to think about participating in a clinical trial.

Cervical cancer in pregnancy

A small number of cervical cancers are found in pregnant women. If your cancer is at a very early stage, such as IA, then most doctors believe that it is safe to continue the pregnancy to term. Several weeks after delivery, a hysterectomy or a cone biopsy is recommended (the cone biopsy is suggested only for substage IA1).

If the cancer is stage IB or higher, then you and your doctor must decide whether to continue the pregnancy. If not, treatment would be radical hysterectomy and/or radiation. If you decide to continue the pregnancy, the baby should be delivered by cesarean section as soon as it is able to survive outside the womb. More advanced cancers, should be treated immediately.

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. Those are available on the NCCN website (www.nccn.org).

The NCI provides treatment information via telephone (1-800-4-CANCER) and its website (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 cervical cancer?

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

- What type of cervical cancer do I have?
- Has my cancer spread beyond the cervix?
- Can the stage of my cancer be determined and what does that mean?
- What are my treatment choices?
- What treatment do you recommend and why?
- What risks or side effects are there to the treatment you suggest?
- Will I be able to have children after my treatment?
- What are my treatment options if I want to have children in the future?
- What should I do to be ready for treatment?
- What are the chances my cancer will recur (come back) with the treatment programs we have discussed?
- Should I follow a special diet?
- Based on what you've learned about my cancer, what is my prognosis (chance of survival)?

- Where can I get a wig if I chemotherapy drugs make me lose my hair?
- What do I tell my children, husband, parents, and other family members?
- How many patients with cervical cancer do you treat each year?

In addition to these sample questions, be sure to write down some of your own. For instance, you might want specific information about recovery time so that you can plan your work schedule. Or you may want to ask about second opinions or about clinical trial options.

What happens after treatment for cervical cancer?

For some women with cervical cancer, treatment may remove or destroy the cancer. Completing treatment can be both stressful and exciting. You might be relieved to finish treatment, but find it hard not to worry about cancer coming back. (When cancer comes back after treatment, it is called *recurrence*.) This concern is very common 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. You can read it online, or call us to have a free copy sent to you.

For other women, the cancer may never go away completely. These women may get regular treatments with chemotherapy, radiation therapy, or other therapies to try to help keep the cancer in check. Learning to live with cancer that does not go away can be difficult and very stressful. It has its own type of uncertainty. Our document, *When Cancer Doesn't Go Away*, talks more about this.

Follow-up care

After your treatment ends, your doctors will still want to watch you closely. Ask what kind of follow-up schedule you can expect. 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 examine you. You will get regular pelvic exams. Most doctors recommend that women treated for cervical cancer keep getting regular Pap tests no matter how they were treated (cone biopsy, hysterectomy, trachelectomy, or radiation). Although normally cells for a Pap test are from the cervix, if you no longer have a cervix (because you had a trachelectomy or hysterectomy), the cells will be sampled from the upper part of the vagina (known as the *vaginal cuff*). Lab tests and x-rays or other imaging tests may also be done look for signs of cancer and long term effects of treatment.

Almost any cancer treatment can have side effects. Some may last for a few weeks to months, but others can last the rest of your life. The visits with your doctor are 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. These exams also give your doctor a way to watch you for signs of the cancer coming back or a new cancer. Women who had cervical cancer have an increased risk of getting vaginal cancer, and are also at risk of getting another HPV related cancer or, more rarely, a cancer that may have been caused by treatment.

It is important to keep your 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.

Should your cancer come back, our document, *When Your Cancer Comes Back: Cancer Recurrence* can give you information on how to manage and cope with this phase of your treatment. You can get this document by calling 1-800-227-2345, or you can read it online.

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 for you to be able to give your new doctor the details of your diagnosis and treatment. Gathering these details soon after treatment may be easier than trying to get them at some point in the future. Make sure you have this information handy:

- A copy of your pathology report(s) from any biopsies or surgeries
- 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 copy of the treatment summary
- If you had chemotherapy, a list of the drugs, drug doses, and when you took them
- Copies of your x-rays and other imaging studies (these can often be put on a DVD)

The doctor may want copies of this information for his records, but always keep copies for yourself.

Lifestyle changes after having cervical cancer

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

A diagnosis of cancer helps many people 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 alcohol, or give up tobacco. Even things like keeping your stress level under control might 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 to start healthy eating habits. 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.

Our document *Nutrition for the Person With Cancer During Treatment: A Guide for Patients and Families* has more detailed information about healthy eating. The section "Additional resources for cervical cancer" has a list of some other documents that might be helpful.

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 situation. Someone who has never exercised should not take on the same amount of exercise as someone 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*. A list of some other documents about dealing with other treatment side effects, can be found in the “Additional resources for cervical cancer” section)

Keep in mind physical activity 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.

How is your emotional health affected by having cervical cancer?

When treatment ends, you may find yourself overcome with many different emotions. This happens to a lot of people. You may have been going through so much during treatment that you could only focus on getting through each day. Now it may feel like a lot of other issues are catching up with you.

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 relationship with those around you. Unexpected issues may also cause concern. For instance, as you feel better and have fewer doctor visits, you will see your health care team less often and have more time on your hands. These changes can make some people anxious.

Almost everyone who 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. Some 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.

If treatment for cervical cancer stops working

If cancer keeps growing or comes back after one kind of treatment, it is possible that another treatment plan might still cure the cancer, or at least shrink it enough to help you live longer and feel better. But when a person has tried many different treatments and 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. 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 might 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 chemo or radiation might have about a 1% 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, you need to 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 documents called *Hospice Care* and *Nearing the End of Life*. They can be read online, or call us to have free copies mailed to you.

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 cervical cancer research and treatment?

New ways to prevent and treat cancer of the cervix are being researched. Some of the promising new developments include the following:

Sentinel lymph node biopsy

During surgery for cervical cancer, lymph nodes in the pelvis may be removed to check for cancer spread. Instead of removing many lymph nodes, a technique called *sentinel lymph node biopsy* can be used to target just the few lymph nodes most likely to contain cancer. In this technique a blue dye containing a radioactive tracer is injected into the cancer and allowed to drain into lymph nodes. Then, during surgery, the lymph nodes that contain radiation and the blue dye can be identified and removed. These are the lymph nodes most likely to contain cancer if it had spread. If these lymph nodes don't contain cancer, the other

lymph nodes don't need to be removed. Removing fewer lymph nodes may lower the risk of later problems.

A clinical trial is looking at a different way of doing a sentinel node biopsy procedure. It maps the lymph nodes using with robotic (laparoscopic) assisted near infrared imaging after injecting indocyanine green (ICG) dye into the cervix.

HPV vaccines

Vaccines have been developed to prevent infection with some of the HPV types associated with cervical cancer. Currently available vaccines are intended to produce immunity to HPV types 16 and 18, so that women who are exposed to these viruses will not develop infections. Vaccines are also being developed to prevent infection with some of the other HPV types that also cause cancer. Studies are being done to see how well these vaccines will reduce the risk of cervical cancer.

Some experimental vaccines are also being studied for women with established HPV infections, to help their immune systems destroy the virus and cure the infection before a cancer develops. Still other vaccines are meant to help women who already have advanced cervical cancer that has recurred or metastasized. These vaccines attempt to produce an immune reaction to the parts of the virus (E6 and E7 proteins) that make the cervical cancer cells grow abnormally. It is hoped that this immunity will kill the cancer cells or stop them from growing.

Targeted therapy

As researchers have learned more about the gene changes in cells that cause cancer, they have been able to develop newer drugs that specifically target these changes. These targeted drugs work differently from standard chemotherapy drugs. They often have different (and less severe) side effects. These drugs may be used alone or with more traditional chemotherapy.

Pazopanib is a type of targeted therapy drug that blocks the effect of certain growth factors on cancer cells. In studies of patients with advanced cervical cancer, it helped them live longer.

Hyperthermia

Some research indicates that adding hyperthermia to radiation may help keep the cancer from coming back and help patients live longer. Hyperthermia is a treatment that raises the temperature in the area where the tumor is, most often by using radiofrequency antennae placed around the patient.

Drug treatment of pre-cancers

Standard treatment of cervical pre-cancer (such as cervical intraepithelial neoplasia; CIN) includes cryotherapy, laser treatment, and conization. Recent studies to see if medicines can be used instead have had some promising results.

In one study, patients with CIN2 or CIN3 took a drug called diindolylmethane (DIM) for 12 weeks. Follow-up testing showed improvement -- in some women, the CIN went away completely.

In another study, CIN was treated by applying an anti-viral drug called cidofovir to the cervix. In more than half of the treated women, the CIN resolved completely. More studies are needed before this can become a standard treatment.

Another anti-viral drug, imiquimod, has also shown promising results in treating cervical pre-cancers.

Additional resources for cervical cancer

More information from your American Cancer Society

Here is more information you might find helpful. You also can order free copies of our documents from our toll-free number, 1-800-227-2345, or read them on our website, www.cancer.org.

Dealing with diagnosis and treatment

Health Professionals Associated With Cancer Care

Talking With Your Doctor (also in Spanish)

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

Nutrition for the Person With Cancer During Treatment: A Guide for Patients and Families (also in Spanish)

Coping With Cancer in Everyday Life (also in Spanish)

Sexuality for the Woman with Cancer (also in Spanish)

Family and caregiver concerns

Talking With Friends and Relatives About Your Cancer (also in Spanish)

Helping Children When A Family Member Has Cancer: Dealing With Diagnosis (also in Spanish)

What It Takes to Be a Caregiver

Insurance and financial issues

In Treatment: Financial Guidance for Cancer Survivors and Their Families (also in Spanish)

Health Insurance and Financial Assistance for the Cancer Patient (also in Spanish)

More on cancer treatments

A Guide to Cancer Surgery (also in Spanish)

A Guide to Chemotherapy (also in Spanish)

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

Clinical Trials: What You Need to Know

Cancer treatment side effects

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

Distress in People With Cancer

Anxiety, Fear, and Depression

Nausea and Vomiting

Guide to Controlling Cancer Pain (also in Spanish)

Get Relief From Cancer Pain

Pain Diary

Anemia in People With Cancer

Fatigue in People With Cancer

Books

Your American Cancer Society also has books that you might find helpful. Call us at 1-800-227-2345 or visit our bookstore online at cancer.org/bookstore to find out about costs or to place an order.

National organizations and websites*

Along with the American Cancer Society, other sources of information and support include:

Foundation for Women's Cancer (formerly the Gynecologic Cancer Foundation)

Toll-free number: 1-800-444-4441

Telephone number: 1-312-578-1439

Web site: www.foundationforwomenscancer.org/

Has a directory of specially trained gynecologic oncologists practicing in the US; free information; and an online "survivor section" featuring articles on personal issues such as fertility, sexuality and quality of life aimed at creating an online community for women with cancer.

National Cancer Institute (NCI)

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

Web site: www.cancer.gov

Their "Cancer Information Service" offers a wide variety of free, accurate, up-to-date information about cancer to patients, their families, and the general public; also can help people find clinical trials in their area.

National Women's Health Information Center (NWHIC)

Toll-free number: 1-800-994-9662 (1-800-994-WOMAN)

TTY: 1-888-220-5446

Web site: www.womenshealth.gov

Offers a lot of information on women's health issues – including cancers in women

National Cervical Cancer Coalition

Toll-free number: 1-800- 685-5531

Web site: www.nccc-online.org

Provides referrals to uninsured, underserved women; information about cervical cancer and its treatment; and phone and email support services

National Coalition for Cancer Survivorship (NCCS)

Toll-free number: 1-877-622-7937 (1-877-NCCS-YES)

Web site: www.canceradvocacy.org

Has publications on many topics, including employment and health insurance, as it relates to cancer. Materials are also offered in Spanish. Also offers the Cancer Survival Toolbox – a free program that teaches skills to help people with cancer meet the challenges of their illness.

Planned Parenthood Federation of America

Toll-free number: 1-800-230-7526

Web site: www.plannedparenthood.org

Offers many women's health services including cervical cancer screening with referrals for specialty care. Services available for the uninsured.

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

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

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Last Medical Review: 9/19/2014

Last Revised: 1/7/2015

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