Myths & Facts about cervical cancer

What you need to know
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Myths & Facts
about cervical cancer
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Introduction

Welcome to Myths & Facts About Cervical Cancer: What You Need to Know. We are privileged to be at your side on your journey in fighting cervical cancer, and we’re going to share with you not only the knowledge that has been collected over the past 2 centuries, which has allowed women to effectively combat this disease, but also important advice and anecdotes from our patients. We also want to use these pages to dispel and clarify many urban legends and myths that have been perpetuated about cervical cancer so that you are armed with facts and an understanding of how the different stages of this disease are treated.

The way to get the most out of this booklet is to recognize two important considerations. First of all, not everything in these pages will apply to your individual case. You may have an early cancer or a more advanced one, in which case the treatments will be different. It will be crucial for you to verify with your doctors that you indeed have cervical cancer and then to ask them what stage they believe the tumor to be in. Second, although cancer can be difficult to cure and sometimes the best we can do is control the disease, you are not a statistic. You are an individual, separate from everyone else by virtue of the differences in your genetic makeup, your environment, and your mindset. Therefore, the treatment guidelines are just that: guidelines. Every patient receives individualized cancer therapy to be given the best chance for a cure.

We are living in exciting times when it comes to taking care of women with cervical cancer. Because of widespread Pap smear testing, the incidence of this disease has dropped dramatically in this country. Over the years, we have learned how best to treat a woman’s individual cervical cancer. In just the preceding 10 years, we have conducted several important clinical trials, which have provided us with evidence-based information on how best to manage early-stage, locally advanced, and metastatic cervical cancers.

Myth
Cancer is a death sentence.

Fact
Many cancers can be cured, oftentimes by surgery, chemotherapy, or radiation therapy alone or in combination. Early detection of cancer, before it has spread or metastasized, is often associated with high survival rates.
So much is known about this disease because it is one of the few cancers that has a long precancerous stage (dysplasia). Perhaps just as important is the fact that cervical cancer is one of the few cancers for which we know the cause: the human papillomavirus (HPV). After years of studying HPV, we now have a cervical cancer vaccine approved by the US Food and Drug Administration (FDA) for girls and young women. We expect even greater advancements in the upcoming years in the prevention and treatment of cervical cancer.

Finally, at the back of this booklet is a useful glossary explaining many of the medical terms that appear in italics throughout the text. Also included are a list of key support groups, both local and nationwide, as well as a list of Comprehensive Cancer Centers.
What Is Cervical Cancer?

The uterus or womb is divided into a body (called the *corpus*) and a neck (ie, the *cervix*). The cervix is the mouth of the uterus that opens up during labor for a baby to pass through when it is born. Above the cervix rests the bladder, and below is the rectum. The vagina is in front, and of course, behind the cervix is the body of the uterus. To either side within the ligaments pass important structures such as the tubes that drain the kidneys into the bladder (called *ureters*), major blood vessels that bathe the pelvis and legs, and channels called *lymphatics* that drain fluids from the cervix to sites called *lymph nodes*. These relationships are important because treatment of diseases of the cervix, especially cervical cancer, must take into account the surrounding structures.

There is a zone inside the cervix where the cells of the cervical canal are replaced by cells that cover the outer part of the cervix. This *transformation zone* is the area where the majority of cervical cancers arise.

**Myth**

Based on the available survival rates for my cancer, it looks as though my chances are not very good.

**Fact**

Although cancer statistics are important tools for doctors and researchers, they do not always contain the entire story. Remember, you are not a statistic. Cancer treatment is individualized based on each person’s characteristics, and there are many factors that go into determining whether a patient can be cured.
Cervical cancer is a disease of epidemic proportions. It is the second most common cancer diagnosis in women worldwide, with 500,000 new cases diagnosed annually. In developed nations, there has been a dramatic decrease in incidence and death rates due to screening. The average age at diagnosis for precancerous changes of the cervix (known as dysplasia) is 29 years, and for invasive carcinoma is 47 years.

In the United States, the lifetime risk of cervical cancer has been estimated at 1 in 117, with 11,000 new cases expected to be diagnosed in 2007. Unfortunately, well over one-third of these women (ie, 3,700) are also expected to die of the disease. The racial incidence of cervical cancer in this country is led by the Hispanic/Latino population at 16.8 women per 100,000, followed by black women (12.4), Asian and Pacific Islanders (10.2), whites (9.2), and American Indian and Alaskan natives (6.9).

When the disease is in its extremely early stage (either precancerous [or preinvasive] or only microscopically invasive), the patient does not have any symptoms. However, once the cancer has invaded the basement membrane of the cervix and taken on the shape of a visible tumor (or lesion), a woman may complain of increased vaginal discharge and/or abnormal vaginal bleeding, which may occur after sexual intercourse, between menstrual periods, or even in the postmenopausal state (eg, typically after 50 years of age). As the cancer grows into the surrounding structures, patients are said to have a locally advanced tumor, which may result in symptoms of pain running down the leg, pain in the back, sharp or dull pelvic pain, swelling of the leg, bleeding from the rectum, and blood in the urine, as well as development of holes in the bladder or the rectum (called fistulas) connecting with the vagina. Once the disease has metastasized outside the pelvis, patients may experience all of these symptoms along with coughing up of blood as a result of cervical cancer that has spread to the lungs or even a bone fracture caused by cervical cancer that has metastasized to the bones.
What Causes Cervical Cancer?

There are several established risk factors for cervical cancer, with the strongest related to sexual behavior. Patients with a history of sexually transmitted diseases (STDs), as well as those who started having sexual intercourse early in life and/or have had multiple sexual partners and/or a promiscuous partner, are at increased risk for cervical cancer. Smoking, along with some cases of immune system suppression (as in patients with AIDS), has also been linked to cervical cancer. Finally, some studies suggest birth control pills place a woman at risk for cervical cancer. Certainly, some women who use birth control pills are less likely to protect themselves with condoms against STDs such as the virus that causes cervical cancer; however, the association with hormonal factors may not be so easily explained.

The HPV infects the outer layers of the skin known as the epithelium. The skin of the labia, vagina, and cervix are especially prone to infection. For some time after a woman has acquired this virus, there are no symptoms. In fact, it may be many years before any evidence of infection can be seen.

Like syphilis, gonorrhea, chlamydia, hepatitis, herpes, the human immunodeficiency virus (HIV), bacterial vaginosis, and yeast infections, HPV is transmitted through sexual intercourse. In addition to cervical cancer, a woman infected with HPV may develop genital warts, which can appear on the labia, in the vagina, and even on the cervix. In men, HPV can cause warts on the penis. In both sexes, HPV can cause warts around the anus. Although these warts are not particularly painful, they are a source of embarrassment and are a real health problem in the US, with nearly 1 million new cases diagnosed each year. Treatment of genital or anal warts may require special

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**Myth**

Once a woman is infected with the HPV virus, she is infected for life.

**Fact**

The majority of young women who contract the human papillomavirus (HPV) will clear the initial infection within 6 months.
creams, laser therapy, or surgery. Babies who pass through an HPV-infected birth canal may develop warts in their nose and windpipe, sometimes leading to pneumonia.

Even more serious than genital warts are the precancerous changes of the labia, vagina, cervix, and penis that can occur with HPV infection. These changes may take a long time to develop, but of course, if left untreated, many will progress to what we term an invasive cancer. Once again, the time from infection to precancerous changes and then to actual cancer can be long, with sometimes more than 10 years elapsing before cancer is detectable. Interestingly, many patients with HPV-associated precancerous changes of the cervix, for example, will experience spontaneous (ie, non-medical therapy-directed) resolution of these changes and clearance of the infection. Other patients will require treatment so that cancer does not develop. Examples of such treatment include cutting out the precancerous area using either the cone or LEEP (loop electrosurgical excision procedure) method or using a laser or even freezing the skin of the cervix (cryotherapy).

Because precancerous changes of the cervix (ie, cervical dysplasia) and cervical cancer are caused by HPV, the risk factors for cervical cancer (as discussed in a previous section) are all associated with sexual behavior, with patients who have had sex early in life and those with multiple partners or a partner who has had multiple partners being at especially high risk for the disease. Yet only certain types of HPV are known to cause disease in humans, and certain subtypes are more likely than others to be responsible for the majority of cases of cervical cancer and/or genital warts. For example, HPV6 and HPV11 are responsible for the majority of cases of genital warts in women but rarely are associated with severely precancerous changes of the cervix or cervical cancer. Conversely, HPV16 and HPV18 are responsible for the majority of cases of cervical dysplasia and invasive cancer.\(^3\)
Screening

Screening for cervical cancer involves the Papanicolaou test or Pap smear. Women should begin screening when they become sexually active or at least by age 21, regardless of sexual activity.\(^4\) The Pap test collects cells from the area of the cervix where HPV is likely to be,\(^5\) the transformation zone; here, cells from the canal of the cervix, which are rectangular or columnar, are replaced by the cells that cover the outside of the cervix, which are flat or squamous. The Pap test is performed together with a careful visual evaluation of the labia, vagina, and cervix by the health provider. Using gloved fingers, the health care provider may also feel if anything is abnormal and check the uterus and the ovaries for any problems.

The cells from a Pap test are placed on a glass slide and covered in a special solution for processing. The

\[\text{Myth}\]

A normal Pap test means that a woman is cancer-free.

\[\text{Fact}\]

The Pap test only screens for cervical cancer or precancerous cells of the cervix. There are no screening tests for uterine or ovarian cancers.

\[\text{FIGURE 3}\]
Collecting cervical cells for a Pap test.
cells can then be checked for abnormalities. Unfortunately, many Pap tests will not appear to be normal; fortunately, few will show evidence of cancer or even severe cases of precancerous changes (ie, severe dysplasia or high-grade disease). Pap tests may be reported as being normal or abnormal. The abnormal category may be divided into subcategories: atypical cells, low-grade lesion, high-grade lesion, and cancer.

About one-half of the time when the Pap test returns with the diagnosis of atypical cells, it is just due to problems like inflammation (ie, infection or trauma) and does not require further testing or therapy. One way to determine whether atypical cells warrant further evaluation is to check the patient’s cervix for HPV infection. The HPV test can sometimes be performed on material collected at the time of the original Pap test; in other cases, the patient may be asked to return for an HPV test. This test looks for evidence of infection with HPV types that are considered to be high risk for development of cancer, such as HPV16, HPV18, HPV31, and HPV33.

When a Pap test shows atypical cells collected from a woman who is positive for high-risk HPV, a search for any precancerous or even cancerous change is undertaken. Similarly, a Pap test showing signs of low-grade or high-grade dysplasia will prompt a careful search for the location of such precancerous changes on the cervix. This typically requires an evaluation called colposcopy, which involves an examination of the cervix using magnification and special staining.

Any cervical biopsy that establishes the presence of early, moderate, or severe dysplasia (termed CIN I, II, and III, respectively) will usually be followed with some type of treatment to correct the problem (eg, a laser, freeze procedure, LEEP, or cone). By catching cervical cancer in its precancerous stage, screening programs have been successful in decreasing the numbers of cases and deaths associated with this disease. Unfortunately, the Pap test is not a perfect screening test, and so many abnormal Pap tests are not caused
by precancerous or cancerous changes. Some patients often end up undergoing many evaluations and biopsies to make sure a cancer is not missed. In the United States, $6 billion is spent each year on screening for cervical cancer with Pap tests, colposcopies, biopsies, and on treatment of dysplasia.

Most abnormal Pap tests reflect noncancerous or precancerous conditions, but a small number will be the result of a cancer. If an actual cancer is discovered through colposcopy and subsequent cervical biopsy, of course, a more intensive treatment program will be required to save the patient’s life.

FIGURE 4
A positive Pap test for cervical cancer.
Signs and Symptoms

Since the Pap test can actually lead to a diagnosis of cervical cancer, it is clear that in many patients, particularly those with early cancers, the disease causes no symptoms. In fact, although genital warts can be unsightly, even warts can be associated with no symptoms. Early detection, then, is of great benefit, saving the patient’s life often without having to resort to what may be considered “drastic” measures.

As previously discussed, in its earliest forms, cervical cancer causes no symptoms. The physical changes are so small that they can only be detected with a microscope. Once the tumor gets large enough to be seen with the naked eye, it may be associated with abnormal vaginal bleeding. A woman may notice that after sexual intercourse, she has some spotting; with early cancer, she may bleed all through the month, not just at the times of her period. In fact, such a patient may think that her period is not ending. Older

FIGURE 5
Clinical presentation of cervical cancer.
patients who have gone through menopause may all of a sudden experience some painless vaginal bleeding. In these situations, as long as there are no other symptoms, such as pelvic pain or signs of disease in other parts of the body, the cancer is likely to be in its early stage and the possibility of cure remains high.9

Once the cancer invades adjacent structures (eg, the bladder above, the rectum below, the vagina in front, the ligaments at its sides), it is referred to as a locally advanced tumor. Patients with such tumors may have heavy vaginal bleeding, resulting in significant anemia and the need for blood transfusions. Others may start noticing pelvic pain that can be severe. Some patients with a locally advanced cancer may leak urine through the vagina because the cancer has grown into the bladder and is creating a hole or fistula between the bladder and the vagina. These patients may find blood in their urine. A similar situation may occur with a fistula in the rectum, which may be associated with rectal bleeding.

Finally, if the cancer has grown into the surrounding ligaments, the tube known as the ureter, which drains each kidney into the bladder, may become blocked and cause back pain. The cancer may press on nerves going to the legs, causing leg pain. Fluid channels known as lymphatics, which drain the legs, may also become closed off due to pressure from the cancer or spread of the tumor cells into the lymph nodes. Patients may notice leg swelling, although the swelling can also be associated with blood collecting in the legs, resulting in a blood clot. This is an especially dangerous situation, as a blood clot in the leg or pelvic veins (ie, a deep venous thrombosis, DVT) can break off and travel to the lungs in the form of a pulmonary embolus, which can be fatal.

Once the cancer has spread to other parts of the body, a patient may experience a variety of symptoms. Bone pain and even a bony fracture may occur when tumor cells have spread to the bones. Patients with tumor cells in their lungs may develop a cough and sometimes cough up blood. Still other patients whose

I knew my bleeding after sex meant something bad was going on. But facing my fears and getting checked and treated for cervical cancer was the best thing I ever did — because I’m alive today.
cancer has spread into the *abdominal* lymph nodes that drain the pelvic region may experience weight loss and lack of appetite if the tumor paralyzes nerves that help to keep the intestines functioning. Sometimes, if the tumor spreads far along the lymph node pathways, patients may develop a firm nodule on the left side of the neck.
Diagnosis, Staging, and Treatment

The most important factors in assessing a patient who may have cervical cancer are to make the correct diagnosis, using a tissue biopsy from the cervix; to address the symptoms whenever possible (eg, a blood transfusion for anemia); and to stage the cancer accurately. Cancer staging is a tool that physicians use to map out where the cancer has traveled in the body.

Because staging for cervical cancer does not require an operation, the International Federation of Gynecology and Obstetrics (FIGO) refers to the staging classification system for cervical cancer as clinical staging. Cervical cancer can be divided into four main FIGO categories: I, II, III, and IV. A FIGO stage I cervical cancer only involves the cervix. Stage I cancers are also subdivided into microscopic (ie, stage IA) or visible (ie, stage IB). Further subdivisions within stage I are also possible. Most stage I cancers represent early disease, except for very large tumors (ie, FIGO stage IB2 cancers that are greater than 4 cm) and stage I cancers that have spread to the lymph nodes.

Stages IB2 and II through IVA cancers represent locally advanced tumors. Stage II cancers have spread to the immediately adjacent vagina and/or to the ligaments just surrounding the cervix. Stage III cancers have spread to the lower vagina and/or out to the pelvic sidewall, where they may cause blockage of the ureter and swelling of the kidney on that side. Stage IV cancers can be locally advanced when they involve the bladder and/or rectum (ie, stage IVA) or spread to sites outside the pelvis such as the lungs (ie, stage IVB). Cancers progressing beyond the pelvis are considered to be metastatic tumors.

A number of different tools and tests are available for staging, including general physical and pelvic examinations, biopsy of the cervix, blood tests to

More than fear of cancer pain, my greatest concern was losing control of my life.
evaluate the functioning of the kidneys and the presence of hidden blood in the urine, and a chest x-ray. Some complex radiologic procedures may include a CAT scan to look at all organs in the abdominal and pelvic cavities, a special test called an intravenous pyelogram (IVP) to look for a blocked kidney, and a PET scan to look for physiologically active “hot spots” in the body. Other patients may be taken to the operating room for an examination under anesthesia to look into the bladder or into the rectum. Clinical staging for cervical cancer does not take into account the status of the lymph nodes, which are an important means through which these cancers spread to other parts of the body.

**How is Early Cervical Cancer Treated (Stages IA1–IB1)?**

Patients with severe cervical dysplasia can have the abnormal cells removed with a cone biopsy of the cervix or an LLETZ (large loop excision of the transformation zone) procedure. Patients with early invasive cancers (FIGO stage IA1) can be treated with a simple hysterectomy performed through an incision in the abdomen or through the vagina, without removal of the ovaries. In patients with stage IA1 to IB1 cancer, and in select cases of FIGO stages IB2 and IIA cancer, diseased tissue can be removed through a complex operation known as a radical hysterectomy. Unlike a regular hysterectomy (total hysterectomy performed abdominally, vaginally, or laparoscopically), a radical hysterectomy removes not only the body and neck of the uterus (ie, the fundus and cervix, respectively), but also the upper third of the vagina and ligaments known as the parametrial tissues, on either side of the cervix. The radical hysterectomy is usually performed together with careful dissection of lymph nodes in the pelvis. The ovaries are left alone unless a physician suspects the patient will likely need additional treatment such as pelvic radiation therapy; in such cases, the ovaries may be moved outside the pelvis to an abdominal location, so they can be spared from receiving most of the radiation. The goal of a radical hysterectomy is to
clear the tumor from the body with a good margin of normal tissue around it, so the surgeon can feel confident that the entire tumor was removed.

Once the cancer grows into the ligaments next to the cervix (ie, stage IIB), it becomes extremely difficult to get a good margin because these structures are not distinct organs. Another reason many doctors prefer not to operate on patients with large stages IB2 and IIA cancers is that the higher the cancer stage, the more likely it is that additional radiation therapy and chemotherapy may be needed after surgery. As it turns out, most evidence suggests that radical surgery plus postoperative radiation therapy and chemotherapy results in equivalent cures when compared with radiation therapy plus chemotherapy for these early-stage tumors; many doctors do not want to potentially subject a patient to three therapies (radical surgery, radiation therapy, chemotherapy) when two (radiation therapy plus chemotherapy) will work just as well.

Two issues are addressed when therapy is being considered for the majority of early-stage cancers. First, for early FIGO stage cancers, the choice between radical surgery and radiation therapy (with or without chemotherapy) may depend on the age and medical status of the patient, since both treatment plans are equally effective. For example, a young, otherwise healthy woman may be treated best with a radical hysterectomy with lymph node dissection when no additional treatment is required, because vaginal...
function and ovarian function are preserved. On the other hand, a woman of any age with multiple medical problems (eg, a weak heart, poor lungs) may do better with radiation therapy with or without chemotherapy, because risks associated with a complex operation such as a radical hysterectomy may be too high. Second, some patients undergoing radical surgery plus lymph node removal may have cancers best treated with additional postoperative therapy.

The Gynecologic Oncology Group (GOG) is an organization of health professionals committed to promoting excellence in research into gynecologic cancers such as cervical cancer. GOG has conducted two clinical trials to address the need for additional therapy. Two groups of cervical cancer patients can potentially benefit from additional therapy after radical hysterectomy with lymph node removal. The first group comprises women with intermediate high-risk factors. Specifically, this group of patients has two of the following features: a large cervical tumor, evidence of tumor cells in the blood vessels and lymph channels of the cervix, and/or microscopic signs that the cancer has invaded deeply into the cervical tissue. Such patients have been shown to benefit from a course of pelvic radiation therapy after surgery.\textsuperscript{13}

The second group of patients has truly high-risk features detected after careful microscopic review of all the specimens removed at the time of operation. These include evidence of disease spread to the lymph nodes or cancer in the adjacent ligaments removed with the uterus or tumor cells at the edges of the surgical specimen (ie, a “positive” vaginal margin). Patients with any high-risk feature should receive pelvic radiation treatment plus chemotherapy.\textsuperscript{14}

**HOW IS LOCALLY ADVANCED CERVICAL CANCER TREATED (STAGES IB2–IVA)?**

The management of locally advanced cervical cancers (stages IIIB–IVA as well as some bulky stages IB2–IIA tumors) has traditionally centered on pelvic radiation therapy. Once again, for the stage IIIB–IVA group, it is not possible to obtain an adequate surgical
margin free of tumor cells without having to remove important structures such as the vagina, the rectum, or even the bladder. In cases in which the tumor has spread to the pelvic wall, it is not possible to clear the cancer with a negative margin.

Special cancer trial groups have been crucial in determining the best way to manage these locally advanced cancers. Besides information obtained by the Gynecologic Oncology Group, studies by Southwestern Oncology Group and the Radiation Therapy Oncology Group performed during the 1990s tested standard pelvic radiation therapy for locally advanced cervical cancer.\textsuperscript{14-18} Comparison groups in these trials were patients matched with the same types of cancers but who received chemotherapy in addition to the pelvic radiation treatments. The large body of information collected during the 1990s suggested that adding chemotherapy to the radiation treatment program would improve results. Chemotherapy was considered to be a “radiation sensitizer,” in that it made the cancerous tissues more sensitive to the effects of radiation. A theoretical added benefit of this approach was that chemotherapy drugs are delivered directly into the bloodstream; taken all over the body, they could potentially kill any cancer cells that may have escaped the pelvic radiation therapy.

Results of these chemoradiation trials were all positive: addition of chemotherapy to radiation treatment of locally advanced cervical cancer decreased the relapse rate by about 50% and improved survival. These studies were published in medical journals in 1999 and 2000. They were so important that the National Cancer Institute issued a Clinical Alert describing the results and effectively changing the standard of care for patients with locally advanced cervical cancer for whom pelvic radiation therapy is being planned: chemotherapy should be included with pelvic radiation treatments.

Typically, patients treated with this combined therapy receive daily treatments of external pelvic radiation 5 days per week, with 1 of those days including a 1-hour infusion of chemotherapy. This

\begin{quote}
I had to put my life on hold for an entire year. Surgery and recovery took 2 months, followed by 3 months of radiation and chemo. Then my body needed another 5 months to recalibrate and heal. What a journey it was!
\end{quote}
regimen usually lasts for 5 or 6 weeks. Afterward, internal radiation therapy is given without chemotherapy. (Further details on chemoradiation treatment will be provided in a later section.)

**HOW IS METASTATIC CERVICAL CANCER TREATED (STAGE IVB)?**

In early and locally advanced cervical cancers there is often real potential for cure. The situation is more complex when cancer has metastasized outside the pelvic cavity (stage IVB). Nevertheless, many patients with aggressive cervical cancers can get their cancer under reasonable control so they can lead somewhat “normal” lives, including going to work, caring for their families, and attending school.

Since the late 1970s, the chemotherapy drug cisplatin has been observed to exert a strong effect on cervical cancer cells, and it is still used in patients with stage IVB tumors. (Cisplatin is also used to help radiation therapy work better on locally advanced tumors.) Through the efforts of the Gynecologic Oncology Group, many different combinations of chemotherapy regimens have been tested for patients with tumors that have spread, and several drugs can now be used in combination to help patients with these advanced-stage cancers.

The reasoning behind use of more than one drug is that each has a different way of fighting the cancer cell. Also, while chemotherapy drugs have difficult side effects, these can be reduced by using different drugs whose side effects are not shared. Smaller doses of each drug can be used when they are given together; this way, the side effects are less intense than they would be with a full dose of the drug used by itself.

One such drug combination is cisplatin plus topotecan (Hycamtin). The combination of cisplatin plus topotecan was the first one to produce an improvement in overall survival for patients with advanced cervical cancer and is the only US FDA-approved chemotherapy combination regimen used to treat advanced or relapsing cervical cancer. Another example is cisplatin plus paclitaxel.
The most important aspect to consider in treating stage IVB disease is that problems caused by the cancer itself are taken care of while the patient is receiving chemotherapy. Even if the cancer has spread outside the pelvis and traveled to the lungs, problems caused by cancer in the pelvis (significant bleeding, pain, and infection) still must be addressed, with blood transfusions, pain medication, antibiotics, and sometimes even radiation treatment to the pelvis. Similarly, if the cancer has spread to the lymph nodes on the left side of the neck and these tumors are putting pressure on the windpipe, a course of radiation treatment to the neck will be necessary, even while the patient is receiving a chemotherapy drug combination. By treating the symptoms of the cancer in different parts of the body, oncologists can make the most of the chemotherapy drug combination and therefore have the best chance of controlling the cancer. Many patients whose cancer symptoms can be palliated while receiving chemotherapy can live reasonably comfortable lives provided their cancer is responding to the drugs.

**WHAT CAN BE DONE TO TREAT A RELAPSE OF CERVICAL CANCER?**

When cervical cancer comes back (relapses), as tends to happen with stage IVB disease, for example, it is usually treated with chemotherapy. Management of cancer symptoms is of great importance, so the patient can have a reasonable quality of life during chemotherapy. Patients often receive cisplatin with topotecan or paclitaxel, as long as they have not previously received these drugs, in which case different drugs or combinations will be used. An exception is if the patient had previously received cisplatin alone as a “radiation sensitizer” to treat what was initially a locally advanced cervical cancer. In such circumstances, a patient experiencing a relapse would likely be given a cisplatin drug combination.

Sometimes cervical cancer relapses in a central location in the pelvis and there is no other evidence (via imaging studies, physical examination, or symp-
toms) that the cancer is anywhere else. This can be seen after treatment with radiation or chemoradiation for locally advanced disease. In such a scenario, a patient may be curable with an ultraradical operation known as total pelvic exenteration. In this procedure, the body of the uterus and the cervix, the vagina, the bladder, and the rectum (and sometimes the vulva) are all removed together in a major undertaking to obtain a clear margin around the cancer. The bladder and rectum need to be removed because after radiation therapy to the pelvis the remaining blood supply is poor, and it will be difficult for this area to heal after any surgical procedure.

Clearly, this type of procedure is complex and associated with significant side effects (both immediate and late), but with careful selection of patients and good psychological counseling, some patients may be given a chance for a cure, even in the face of relapsing cervical cancer. Although these major surgeries can take up to 9 hours, through advances in surgery and intensive care monitoring, the risk of death related to surgery is under 5%, and cure rates as high as 60% have been reported by some centers.9

Advances in the surgical technique of the restorative phases of the pelvic exenterative procedure are an important component.21 Many patients can have a new vagina created using surrounding muscles and skin flaps, whereas others can have a new bladder created that they can learn to catheterize with a thin straw. Finally, the need for a colostomy bag (on the abdomen, for stool) can be avoided in most patients with the use of stapling devices, which can bring the remaining colon down to the level of the anus after the rectum has been removed.

If, however, during the operation any evidence of metastatic cancer that had not been detected before surgery is uncovered, the patient would best be served with avoidance of such a major operation and would subsequently be treated with a chemotherapy drug combination such as cisplatin plus topotecan.

Myth
Excellent and active cancer drugs are not being made available because of bureaucratic red tape in agencies like the FDA and pharmaceutical companies.

Fact
The Gynecologic Oncology Group, for example, receives funding from the National Cancer Institute and has access to promising new drugs, which they study in clinical trials. Once a drug has been shown to be safe and active against a tumor, every effort is made to obtain FDA approval in a timely fashion. Many FDA-approved drugs are available in the fight against cancer.
Surgery: What to Expect

The most common operation to treat early-stage cervical cancer is radical hysterectomy with lymph node removal (bilateral pelvic lymphadenectomy). This procedure does not involve removal of the ovaries but does remove the upper one-third of the vagina along with the ligaments next to either side of the cervix. After this operation, patients may expect normal vaginal and ovarian function.

To prepare for surgery, physicians will make sure patients are healthy enough to endure a 3- to 4-hour operation. Several laboratory tests will be performed, and the bowels will be cleaned out with laxatives and enemas. The operation may be performed through a “bikini” type of cut or incision (from side to side just above the pubic bone) or an up-and-down (ie, midline vertical) cut. Before surgery, plan to discuss with the surgeon the type of incision that will be made.

As with any surgery, it is important to understand the three major risks: bleeding, infection, and injury to surrounding organs and structures. With respect to bleeding, up to 50% of women undergoing a radical hysterectomy may receive a blood transfusion. Fortunately, these days blood is very safe; blood is collected from donors who have been screened for STDs, and it is treated with x-rays to kill any viruses that may have escaped detection. Currently, the chance of contracting hepatitis from a blood transfusion is about 1 in 30,000, and the chance of having the HIV virus transmitted during a blood transfusion is even lower, at 1 in a million. Of course, there may be an opportunity for patients to ask a close friend or relative with the same blood type to donate blood on their behalf or to donate their own blood for the procedure. It will be necessary to stop taking any aspirin or ibuprofen-containing pain medications prior to surgery, to de-

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**Myth**

A radical hysterectomy means my ovaries will be removed.

**Fact**

A radical hysterectomy does not involve doing anything with the ovaries. Rather, it involves removing the entire uterus (body and cervix), the ligaments surrounding the cervix (called the parametrial tissues), and the upper vagina.
crease bleeding. Patients who are receiving blood thinner and medications for other conditions should discuss this with their surgeon to learn the correct way to discontinue these drugs if necessary.

In terms of the risks of infection, not only can the abdominal wound become infected, but also the tissues deep in the pelvis are at risk, as are the urinary tract and the lungs. An antibiotic will be given intravenously as a precaution before surgery, and if there are any signs or symptoms of an infection several days after surgery, additional antibiotics may be given either intravenously or orally. One way to prevent infection in the lungs is to stop smoking prior to surgery, practice deep breathing exercises before surgery, and vigorously use the **incentive spirometer**, which will be at the bedside after the operation. This device will help the lungs expand better after anesthesia.

After surgery, an IV line will be in place along with one or more catheters in the bladder. Elastic stockings and devices called **sequential compression devices** will be placed on the patient’s legs to keep the blood from becoming sluggish. These devices must be kept on at all times while the patient is in bed. Although each surgeon’s protocol may be slightly different, most patients typically will be given clear liquids on the first day after surgery and a soft or regular diet on the second postoperative day.

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**Myth**

If an operation is performed to remove the cancer, the moment the body is opened up, the cancer will spread everywhere.

**Fact**

Surgery is an important component in the treatment of many cancers that arise in the human body. Exposure of tumors to air during surgery does not cause them to spread.

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**FIGURE 7**

Organs and structures of the female genital system.
### What to Expect Following Surgery*
*(Radical hysterectomy with lymph node removal)*

- **Postoperative Day 1:** Patients will be encouraged to get out of bed and begin walking as soon as possible (no later than the second day after surgery). Getting out of bed and walking will decrease the chances of developing a blood clot in the legs.
- **Postoperative Day 2:** Patients probably will be able to shower while sitting in a chair in the hospital shower.
- **Postoperative Day 3 or 4:** By the third or fourth day after the operation, patients may be discharged, as long as they have not developed an infection. Patients are typically given prescriptions for pain medication and a stool softener to be used as needed.
- **2 Weeks After Surgery:** A follow-up visit is typically scheduled 2 weeks following surgery, at which point a discussion of the final results of surgery is needed (eg, whether cancer was found in the lymph nodes or additional treatment in the form of radiation therapy plus/minus chemotherapy is required). Before this appointment, a visit to the nurse’s clinic may be scheduled to have the staples along the incision removed.
- **3 Weeks After Surgery:** Patients usually can drive provided they are not taking any narcotic pain medications (such as Vicodin, Darvocet, or Percocet). Also, the incision should not be sore, otherwise it will limit the ability to make defensive movements while driving. Showering is acceptable for the first few weeks. The incision should be covered with some plastic wrap during showering, and allowed to “breathe” at night.
- **6 Weeks After Surgery:** Taking a bath is permitted. Also at 6 weeks, patients will be re-examined by their surgeon and most likely given permission to return to work as well as to have sex. Although the vagina is shortened somewhat after this type of an operation, it is an elastic organ, and with careful but deliberate and continued use, sufficient vaginal depth should be restored.
- **8 Weeks After Surgery:** Usually around 8 weeks after surgery, the patient’s body has recovered well enough to permit resumption of routine exercise.

*Please note that protocols may vary, depending on the surgeon (eg, earlier discharge on postoperative day 2, etc.).

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**Myth**

If a woman younger than age 50 undergoes surgery for cervical cancer, she will need hormone replacement therapy.

**Fact**

The majority of cervical cancers that can be treated with a hysterectomy do not require that the ovaries be removed, unless the patient is postmenopausal.
After a radical hysterectomy, two specific problems frequently reported by patients include constipation and difficulty in urination. Constipation is usually mild and easily managed with a soft diet and stool softeners during the early recovery period. Management of the difficulty in urination, however, can be a little more complicated because during performance of a radical hysterectomy, a large amount of the bladder is mobilized to clear the cancer.

What normally happens is that when the bladder becomes full, a signal goes to the brain saying it is time to urinate. In many patients (and especially those who have undergone surgery for a large cervical tumor), that signal is lost for some time, and so the bladder fills with urine; since no signal is sent to the brain, the bladder continues to fill until it gets so stretched that it causes discomfort.

There are two ways to handle this problem. The first is for the surgeon to leave a Foley catheter in the bladder for a few weeks and then take it out in the office. Since the tube goes from the vaginal area (where there are bacteria) through the urethra and into the bladder, in such instances, a prescription for an antibiotic may be given. Once the catheter is removed, if any voiding difficulty remains, patients may be taught to self-catheterize the bladder.

The second way to circumvent loss of sensation by the bladder is for the surgeon to put a suprapubic catheter into the bladder at the time of surgery. This catheter will exit from the pelvis through one side of the abdominal wall. The advantage of this type of catheter is that the bag can be strapped around the thigh with a belt and worn under clothing; as the days go by, the tube can be blocked with a rubber band, the bladder can fill up, and then patients can try to void every 2 to 3 hours around the clock. This is called bladder training and avoids the possibility of removing the catheter too soon. Once normal amounts of urine can be voided and the urine that drains into the catheter bag after removal of the rubber band is minimal, the catheter can be removed.

**Myth**

After a radical hysterectomy, sex will never be the same.

**Fact**

Although the surgical treatment of cervical cancer involves removing the upper portion of the vagina, at the completion of a radical hysterectomy, vaginal intercourse can resume once the back of the vagina has healed, and intercourse post-hysterectomy is typically not associated with significant difficulty. Unlike radiation therapy, which often results in vaginal fibrosis, radical surgery does not compromise the elasticity of the vagina.
Although it is beyond the scope of this booklet to discuss some of the innovations in radical surgery for cervical cancer, it is good to know that the continued development of laparoscopic radical hysterectomy with laparoscopic removal of the lymph nodes, nerve-preserving radical hysterectomy, and even identification of the sentinel lymph node in cervical cancer may decrease some of the specific side effects experienced by patients who undergo full pelvic lymphadenectomy.

FIGURE 8
Suprapubic catheterization.
Radiation Therapy: What to Expect

Although radiation therapy may be used after surgery when the pathologist finds signs that the patient is at high risk for relapse, it is primarily used to treat locally advanced cervical cancers (ie, stages IB2–IVA). Some of the common side effects of radiation therapy include dry, reddened skin in the treated area, fatigue, and anemia. Three types of radiation therapy are discussed in the sidebar on page 27.

Some of the long-term side effects of radiation therapy that may develop include radiation cystitis and radiation proctitis. Radiation cystitis is caused by internal radiation injury to the bladder and can result in painful urination and/or blood in the urine. Radiation proctitis results from injury to the rectum and can also be characterized by bleeding. These kinds of symptoms should be reported to the doctor. When radiation to the pelvis is combined with chemotherapy, the effect on the bone marrow (specifically the marrow in the pelvic bones and large upper leg bones, the femurs) can be great, and patients may experience significant anemia\(^\text{24}\) and even suppression of their immune system. Further description of the bone marrow effects of chemotherapy is presented in the following section.

Another important precaution to keep in mind regarding potential side effects of radiation therapy is whether the ovaries are being exposed to treatment. If that is the case and the patient is younger than age 50, hormone replacement therapy in the form of estrogen will be needed to counteract possible hot flashes. Since most patients undergoing radiation treatment for locally advanced cervical cancer still have their uterus, estrogen therapy should be combined with

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**Myth**
Radiation treatments will cause my hair to fall out.

**Fact**
When radiation is used to treat cervical cancer, patients do not lose their hair. Even when chemotherapy is given along with radiation therapy, the drug most commonly used, cisplatin, does not result in hair loss.

I had thought that riding the shuttle with other cancer patients to receive radiation therapy was something I would hate to do, but everyone was so supportive of each other, and I needed that kind of support.
Radiation Therapy for Cervical Cancer

- **External-Beam Radiation Therapy**—This usually lasts 5 to 6 weeks and is given 5 days per week. With this treatment, a radiation machine focuses a beam of x-rays onto the pelvis; the goal is to treat both the main tumor on the cervix as well as the sides of the pelvis where the lymph nodes are and where the cancer may be involved. This is performed in a radiation oncology unit or suite. The treatment itself does not cause any discomfort; however, some patients may experience diarrhea afterward, especially as they get further along into treatment.

- **Radiation-Sensitizing Chemotherapy**—As previously described, chemotherapy agents are classes of drugs that kill cancer cells through a variety of mechanisms. One such agent is cisplatin, which when given 1 day each week with external radiation therapy, helps improve survival for patients being treated for locally advanced cervical cancer. Although cisplatin is well known for causing nausea and vomiting as well as injury to the kidneys and nerves that travel to the legs, at the relatively low doses that are used when it is given with external radiation therapy, these side effects are minimized. Nevertheless, oncologists will provide medications to take before and after chemotherapy to prevent nausea and allergic reactions to the drug. In addition, nurses in the infusion center, where the chemotherapy is given, will monitor the intake of fluids and the amount of urine, so any problems with the kidneys can be caught and treated early.

- **Internal Radiation Therapy**—Known as brachytherapy, internal radiation therapy is given in the radiation oncology unit if a high–dose-rate system is used or in the hospital if traditional low–dose-rate systems are used. Both high–dose-rate and low–dose-rate brachytherapy treat the cancer equally well. The main practical differences between them are that high–dose-rate treatment is performed on an outpatient basis, is completed in approximately 15 minutes, and is administered 6 to 8 hours apart usually in two or three applications; low–dose-rate treatment requires a 2–3 day hospitalization and is typically given two times with a 1.5- to 2-week break in between. The choice of high–dose-rate vs low–dose-rate treatment is usually related to the specific cancer center in which the patient is receiving treatment. The technique of internal radiation therapy involves placing radioactive sources inside the uterus and vagina to “finish off” the central cancer that has shrunk down with external radiation therapy plus chemotherapy. Although internal radiation therapy is not comfortable, it is not painful either.
another hormone, progesterone, to counteract the negative effects estrogen will have on the endometrium or inner lining of the uterus.

Other possible complications of radiation treatment are fistulas between the bladder and the vagina or between the rectum and the vagina. Blockages of the small intestines also may occur, causing significant bloating of the abdomen, along with nausea and vomiting. Some of these complications may need to be treated surgically.

Two important observations must be made when considering many of these complications related to radiation therapy. First of all, several of these complications (fistulas, bleeding from the bladder or rectum, small bowel obstruction) can also result from a relapse of the cancer—therefore, any symptoms suggestive of these conditions must be reported immediately to the oncologist. Second, many of these complications, including vaginal fibrosis, may not appear for many years, so knowing a patient’s medical history, specifically the details of any pelvic radiation treatments, can be helpful if unusual signs and symptoms develop that involve the intestines, vagina, bladder, or rectum.
Chemotherapy: What to Expect

Chemotherapy kills cancer cells by preventing them from dividing or reproducing without control. As previously discussed, chemotherapy may help radiation therapy work better when used for locally advanced disease (ie, stages IB2–IVA) or as the main treatment when a cancer has metastasized (ie, stage IVB) or relapsed. For this discussion, we will focus on metastatic or relapsed disease. Unlike the experience with radiation therapy, most chemotherapy side effects occur within the first 15 days of treatment. The reason patients have side effects from chemotherapy and radiation therapy is that these treatments are not specific for cancer cells, so normal tissues can be injured as well.

Because different chemotherapy drugs have different mechanisms through which they injure cancer cells (and normal cells), side effects will vary. Some patients also experience allergic reactions to chemotherapy drugs; however, routine use of steroid medications around the time of treatment can address this problem. Common side effects of chemotherapy include nausea and vomiting; alopecia (hair loss); and injury to the kidneys, peripheral nerves, and bone marrow. These side effects occur because hair follicle cells and cells that line the stomach are in continual turnover, meaning they are actively dividing. Thus, they are also targets for the chemotherapy drugs. Many patients opt to wear wigs during treatment if they are receiving drugs that cause their hair to fall out; some wrap colorful scarves around their heads. Fortunately, hair grows back (sometimes thicker, curlier, and with a touch of grey), and special medications given around the time of chemotherapy and for a few days afterwards can prevent significant nausea and vomiting.

Myth

Chemotherapy makes patients deathly ill.

Fact

Patients are able to tolerate most chemotherapy drugs, and several are tolerated very well. Your doctor can prescribe medications to limit the development of nausea, vomiting, weakness, and even numbness that may occur during cancer treatment.

I had always stigmatized cancer patients before I became one. The image of the bald, undernourished, yellow-skinned woman throwing up in the bathroom was terrifying.
If patients are receiving a chemotherapy drug that can injure the kidneys (ie, a *nephrotoxic* drug), the nurse will give them IV fluids and carefully monitor the amount of urine collected. Peripheral nerves extend from the spinal cord to the arms and legs, and certain drugs can injure these nerves. In this case, special medications can be given to minimize this side effect (eg, the drug *amifostine* [Ethyol]); any unusual sensations in the arms, hands, legs, and feet should be reported. Some of these sensations may include numbness or tingling in the hands and/or feet or even leg cramps and difficulty with normal walking. Sometimes, these patients may notice that it has become difficult to put earrings in or button a blouse.

Finally, the *bone marrow* makes all the blood in the body. There are three main types of blood cells, as outlined in the sidebar on page 31.

Most chemotherapy drugs are given *intravenously* (IV). One option is a special IV line called a PICC (peripherally inserted central catheter), which goes in on the other side of the elbow, or a portacath, which is inserted through the chest wall into the large veins leading to the heart. Both types of lines can stay in for the duration of chemotherapy, which can take 5 months or longer. An advantage of the PICC line is that it can be inserted at the nurses’ clinic, whereas the portacath needs to be inserted in the operating room or the radiology department.

Most chemotherapy drugs used to treat metastatic or recurrent cervical cancer are given on a 21-day schedule. This means that one cycle of chemotherapy is given over the course of a day on the first day of treatment and then the second cycle will not be given until 3 weeks later, or on day 22. Blood tests will be performed between treatments to monitor red blood cell, white blood cell, and platelet counts.

Some of the common chemotherapy drugs used to treat advanced or recurrent cervical cancer include *cisplatin*, *topotecan*, *paclitaxel*, and *carboplatin*. The sidebar on page 32 lists common side effects seen with these drugs. Typically, cisplatin is combined with either topotecan or paclitaxel. As previously men-
Types of Blood Cells

- **Red blood cells**—These cells carry oxygen to all organs of the body. If the red blood cell count is low, patients will become anemic and fatigue easily. A normal hemoglobin level is approximately 13 g/dL. Sometimes a patient whose hemoglobin level has fallen below 11 to 12 g/dL will need to receive a blood transfusion or injections with medications that stimulate the bone marrow to make more red blood cells (eg, Epogen or Procrit). A good hemoglobin level actually helps radiation therapy work well and makes patients feel stronger throughout their therapy.

- **Platelets**—These cells are responsible for making the blood clot whenever there is bleeding. A normal platelet count is in excess of 150,000 cells per cubic millimeter (mm$^3$). If it drops low, a patient may notice that she bruises easily. Fortunately, spontaneous bleeding only occurs if the platelet count becomes extraordinarily low, which rarely happens with chemotherapy. However, if the platelet count falls below 100,000, some patients may require a platelet transfusion from the blood bank before they are able to receive their next dose of chemotherapy.

- **White blood cells**—These cells defend the body against infection and are part of the immune system. If the white blood cell count becomes too low (ie, below 4,000 per mm$^3$) and a component of the white blood cell count known as the absolute neutrophil count (ANC) is below 1,500 per mm$^3$, there may be a risk of infection. Otherwise-healthy individuals not being treated for cancer generally have enough white blood cells to fight off the infection. If the number of cells becomes too low as a result of chemotherapy, however, even a simple infection can become serious. If the ANC is too low (it will be checked regularly during chemotherapy), patients may be advised to avoid eating any raw fruit, meat, fish, or vegetables; gardening; being in contact with sick children; and dining in restaurants. Also, their temperature may be checked every 6 hours; if it goes above 100.4°F, another blood test may be required. Patients who develop an infection while their ANC is very low may need to be put in an isolated part of the hospital, and require antibiotics and medications (eg, Leukine, Neupogen) to stimulate the bone marrow to make more white blood cells. Even if the infection clears, patients may need to delay the next treatment until their ANC recovers.

mentioned, the combination of cisplatin plus topotecan was the first regimen to demonstrate a significant survival advantage over cisplatin alone in women with advanced or relapsing cervical cancers, which led to the chemotherapy combination regimen being
approved by the US FDA. Carboplatin is similar to cisplatin, and although it has not been studied as extensively in cervical cancer, it has a more favorable side-effect profile than does cisplatin. Carboplatin is often combined with paclitaxel.

Some of the newer drugs being studied are not specifically chemotherapy drugs but are referred to as biologic agents. One such drug, bevacizumab (Avastin), which has shown promise in other solid cancers, blocks blood vessels from growing and nourishing a tumor. The process of blood vessel formation is called angiogenesis and has been associated with aggressive cervical cancers\(^2^5\), the ability to block this process with a biologic agent may help in the fight against cervical cancer.

### Side Effects of Drugs Used in Treating Cervical Cancer

<table>
<thead>
<tr>
<th>Drug</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisplatin</td>
<td>Kidney toxicity, peripheral neuropathy (nerve numbness, tingling), nausea,</td>
</tr>
<tr>
<td></td>
<td>and vomiting</td>
</tr>
<tr>
<td>Topotecan</td>
<td>Bone marrow suppression, some hair loss, nausea, and vomiting</td>
</tr>
<tr>
<td>Paclitaxel</td>
<td>Bone marrow suppression, hair loss, peripheral neuropathy, nausea, vomiting,</td>
</tr>
<tr>
<td></td>
<td>allergic reactions</td>
</tr>
<tr>
<td>Carboplatin</td>
<td>Bone marrow suppression, nausea, and vomiting</td>
</tr>
</tbody>
</table>

\(^{a}\) Bone marrow suppression can cause problems including anemia, fatigue, increased bleeding/bruising, and infection.
Completion of Treatment

Once treatment for cervical cancer is completed, a surveillance or observation period will begin to ensure patients have recovered from the effects of therapy and to detect the first signs of any relapse. Typically, for an early-stage cervical cancer, it can take up to 8 weeks to recover from radical surgery. How the incision is healing and whether the soreness and discomfort associated with abdominal surgery have resolved should be assessed. It will also be important to evaluate bladder and bowel function.

If radiation therapy with or without chemotherapy after surgery was needed for an early-stage cervical cancer or radiation therapy plus chemotherapy was given for a locally advanced tumor, once again the first priority after completion of therapy is to ensure that patients have recovered from some of the early side effects of this treatment. This monitoring includes checking blood for signs of suppressed bone marrow activity, evaluating the skin that was directly in the path of the x-ray treatment, and making sure that diarrhea has resolved. Hormone replacement therapy, if needed, should also be instituted. Of course, it is necessary to diligently record any unusual signs and symptoms that may occur over the course of many years and that might suggest a late complication of pelvic radiation therapy (eg, blood in the urine or from the rectum, leakage of fluid or feces from the vagina, difficulty keeping food down, or difficulty with vaginal intercourse).

For patients treated for early or locally advanced cancers, a typical follow-up program involves being seen by the oncologist every 3 months for a period of 2 years, then every 4 months for the third year, and every 6 months for the fourth and fifth years. At each visit, patients will be asked about their general sense

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**Myth**

Once a patient has received treatment for cervical cancer, she cannot develop any other cancers in the reproductive tract.

**Fact**

Cervical cancer patients are also at risk for vaginal, vulvar, and even anal cancers, because these can also be caused by HPV. Patients who did not have a hysterectomy and received radiation therapy are at risk for uterine cancer, and any bleeding must be carefully investigated. Finally, if the ovaries are still present, they can develop tumors. The bottom line is that even if after cancer treatment is completed and a patient has been given a clean bill of health, close observation and surveillance must continue for life.
Sometimes I even forget what I’ve been through. The other day I was in an audience and the speaker asked all of the cancer survivors to stand up. I didn’t stand and my girlfriend turned to me and asked, “Didn’t you have cancer once?”

I believe the whole experience of being told you have a life-threatening illness puts everything else in perspective. Things that used to stress me out seem unimportant now.

The oncologist will then assess the patient’s level of well-being and whether there are lingering treatment side effects or new symptoms. A careful examination of the lymph nodes around the neck and groin areas, as well as abdominal, pelvic, vaginal, and rectal examinations, will be performed. A Pap specimen from the back of the vagina will also be routinely collected. Depending on the symptoms reported by patients or findings on physical examination or on the Pap test, the oncologist may occasionally order a CAT scan of the chest, abdomen, and/or pelvis, although its routine use is not recommended if there are no concerning symptoms or suspicious findings. In these groups of patients, it is safe to say that if the cancer were going to relapse, it would do so within the first 3 years following treatment, although strictly speaking, patients are not considered cancer-free until at least 5 years after therapy.

Some patients with metastatic cervical cancer who receive chemotherapy may reach the point at which their cancer is under control and a break from chemotherapy may be advisable. These patients need to have their blood counts assessed regularly to make sure their bone marrow recovers from the effects of the drugs, and a regular pelvic examination performed to spot any signs of disease progression in that area. They should be evaluated on a monthly basis.
Can Cervical Cancer Be Prevented?

Routine use of Pap testing has significantly decreased the incidence of cervical cancer in the United States and in other developed nations. As a result, the vast majority of women who develop cervical cancer have not been screened routinely. Even with screening, there are more than 11,000 new cases of invasive cervical cancer reported annually in the United States. Remember, cervical cancer strikes women during the prime years of their lives (typically the late 30s and 40s) and results in 3,700 deaths each year. The search for better ways to prevent this disease in our country and in poorer parts of the world, where it remains an epidemic, has been ongoing for some time.

One promising approach has been the development of the HPV vaccine to prevent cervical cancer.\textsuperscript{26-28} By looking at successful vaccination programs for other viral diseases, researchers have developed a cervical cancer vaccine called \textit{Gardasil}, composed of virus-like particles (ie, not actual live virus) that stimulate an immune response against the important HPVs that cause the majority of severe dysplasias and cervical cancers (ie, HPV16 and HPV18) as well as against the HPVs that cause the majority of genital warts (ie, HPV6 and HPV11).

\textit{Gardasil} was approved by the US FDA in May 2006 for girls and young women ages 9 through 26. Vaccination with \textit{Gardasil} is given intramuscularly in three doses on day 1, month 2, and month 6. The studies that led to its US FDA approval showed that patients who received the vaccine had significantly reduced rates of severe dysplasia (actually no cases were reported in those who were vaccinated) compared with the placebo group; in addition, there was only one case of genital warts in the vaccinated group, compared with numerous cases in the placebo
The vaccine, moreover, was well tolerated with no serious side effects.

Some of the unanswered questions regarding this vaccine that are still under study include whether women older than age 26 and boys should also be included in the vaccination program. Finally, the duration of the immunity created by the vaccine is not known, and it is possible that patients will need a booster dose at a later date.

**Myth**

If I get the cervical cancer vaccine, I won’t have to have Pap smears anymore.

**Fact**

The cervical cancer vaccine has been approved by the US FDA for use in girls and young women ages 9 through 26. It must be emphasized, however, that the vaccine does not eliminate the need for regular screening for cervical cancer, including the performance of routine Pap smears.
APPENDIX 2

Special Situations

CERVICAL CANCER IN PREGNANCY

With more women in the United States delaying childbearing into the later reproductive years, it is not surprising that cancer in pregnancy is seen more frequently these days than in the past. Interestingly, among the cancers to occur most commonly in pregnancy are cervical dysplasia, invasive cervical cancer, and breast cancer.

As in non-pregnant patients, cervical dysplasia in pregnant women does not cause symptoms. It usually comes to attention because of the routine use of Pap testing in pregnancy. In fact, the Pap test obtained during pregnancy may be the first Pap test for many young, otherwise healthy women. Biopsies of the cervix can be performed safely during pregnancy, although care must be taken because the cervix can bleed more than usual at this time. The most important consideration regarding a diagnosis of cervical dysplasia is whether or not there is any suspicion of an invasive cancer. If there is no suspicion, the patient may be followed through the pregnancy with colposcopy every 10 to 13 weeks and allowed to deliver the baby vaginally if possible.

Six weeks after delivery, patients should be re-evaluated with colposcopy and a Pap test. Interestingly, some reports state that passage of the baby through the birth canal may actually “peel off” the abnormal precancerous cells of the cervix, making it look as though the cervical dysplasia regressed during pregnancy. If dysplasia is still present after delivery, it can be treated in the same way as it is treated in non-pregnant patients: with either a LEEP, a cone biopsy, laser therapy, or cryotherapy.

If an early-stage invasive cervical cancer is discovered during pregnancy, treatment options depend on how advanced the pregnancy is. If the pregnancy is less than 20 weeks’ duration and the patient indeed
has an early-stage tumor, immediate treatment without regard for the pregnancy traditionally has been recommended, but there have been increasing numbers of reports of treatment delays until the baby can be delivered safely (at around 34 weeks) that have not compromised the life of the mother. If the pregnancy is beyond 20 weeks, waiting until the baby’s lungs mature is certainly acceptable.

We recommend a close consultation with maternal-fetal medicine specialists, neonatologists, and anesthesiologists. Usually, these patients receive steroids to help the baby’s lungs mature, and then some of the fluid around the baby is tested to ensure that the baby’s lungs are fine. This procedure is called an amniocentesis. If everything is going well, a planned Cesarean section with immediate radical hysterectomy and lymphadenectomy is scheduled at around 34 weeks. Radical hysterectomy is actually made easier by the changes to the pelvic tissues caused by the pregnancy. It is important for the mother with an invasive cervical cancer not to deliver vaginally, as the tumor may cause an obstruction that interferes with labor, or tumor cells may be distributed into the vaginal area, for example in the episiotomy scar.

If a patient is diagnosed with a locally advanced or metastatic cervical cancer during pregnancy, treatment should be instituted immediately, unless the pregnancy is far enough along to allow for a Cesarean section.

**FERTILITY-PRESERVING THERAPY**

Some women with an invasive cervical cancer may not have had children before the diagnosis was made. If there is a desire for children and the cancer is detected early (eg, stages IA1–B1), there is a possibility of treating the cancer effectively while preserving the potential for future childbearing.

Traditionally, patients with stage IA1 tumors have been treated with a simple (not radical) hysterectomy, removing the cervix and the uterus. This procedure can be performed transvaginally, with laparoscopic assistance, or through a laparotomy incision. In every case, care must be taken not to damage
the cervix as it is being removed. For women with a stage IA1 cervical cancer who strongly desire children, the cancer may be removed with a cone biopsy of the cervix\textsuperscript{31}; provided the edges of the biopsy give good clearance of the cancer, patients can be carefully followed with regular Pap tests and scrapings from within the cervical canal.

For patients who have a higher stage cancer (stages IA2–IB1), a highly specialized procedure called a \textit{vaginal radical trachelectomy with laparoscopic pelvic lymphadenectomy and cerclage placement} may be considered, provided the cancer is not larger than 2 cm and patients can be responsible with follow-up appointments.\textsuperscript{32-34} In this operation, the lymph nodes are removed using the laparoscope; if nothing obviously suspicious is found, attention is then turned to the vagina. The upper vagina, cervix, and ligaments along the sides of the cervix (ie, the \textit{parametria}) are removed, and a special stitch is placed across the mouth of the uterus to keep it closed. Once again, this procedure is highly specialized and can only be performed by skilled surgeons. Patients must understand that such an operation falls outside the standard of care for invasive cervical cancer, but according to most reports, it appears to be safe, provided the selection criteria for candidates are stringently followed. Patients should also be counseled that although many successful pregnancies have been carried to term after this type of operation, nevertheless there is a risk of miscarriage or early labor owing to weakness at the mouth of the uterus.
What About Quality of Life?

Any discussion about cancer treatment must emphasize the importance of a good quality of life and a strong positive outlook. Patients can experience difficult times not only during cancer treatment but also long after treatment has ended. Sex and intimacy are essential and should not be considered taboo after undergoing treatment for cervical cancer. A trial of vaginal dilator therapy may be needed to make sex comfortable again. The link between mind and body is not purely theoretical, and some patients find a means to bring their will and mental attitude into the healing process through meditation, yoga, spiritual self-discovery, and support groups.

Nutrition cannot be overemphasized, and ensuring an adequate caloric and protein intake as well as supplements such as multivitamins and herbal remedies may help to strengthen not only the body but also the functioning of the immune system. Hormone replacement therapy should not be neglected if patients have gone into premature menopause as a result of radiation treatment. Of course, a regular exercise program, attention to beauty—especially during chemotherapy (ie, wigs, make-up, outfits), and keeping busy with family, close friends, work, and school are all part of the equation of success when fighting cancer. And patients should not forget to laugh out loud as much as possible, because what people say about laughter is true: it really is the best medicine.
References


Glossary

**Abdomen:** The part of the body below the diaphragm between the chest and the pelvis that contains organs such as the liver, stomach, pancreas, bowel, and kidneys.

**Absolute Neutrophil Count (ANC):** The number of bacteria-fighting cells in the white blood cell count of a blood sample.

**Adjuvant:** A substance added to a vaccine to improve the immune response so that less vaccine is needed.

**Alopecia:** Loss of hair.

**Amifostine:** A drug that can help decrease the nerve damage that can occur with certain chemotherapy drugs. Also called Ethylol.

**Amniocentesis:** A procedure through which a sample of amniotic fluid is removed from the pregnant uterus using a needle and syringe under ultrasound guidance; this fluid can then be tested to determine whether the baby's lungs are healthy enough to allow the baby to be delivered, so that a woman's cervical cancer can be treated as quickly as possible.

**Anemia:** A deficiency of red blood cells.

**Angiogenesis:** The process of blood vessel formation.

**Antibiotic:** A class of drugs that can be given in pill form or into a vein to fight off infection.

**Antibody:** A substance produced by the body to defend the body against infection.

**Antiemetic:** A medication given to prevent nausea and vomiting.

**Antigen:** A foreign substance in the body that stimulates the body to produce antibodies against it, such as a protein, bacterium, virus, or other material.

**Benign:** Non-cancerous.

**Bevacizumab:** A biologic drug in the form of an antibody that blocks the process of tumor angiogenesis. Also called Avastin.

**Biopsy:** Microscopic examination of tissues and cells removed from the body to determine the presence of cancer.

**Bladder Training:** A period of time after a radical hysterectomy when the bladder is gradually tested and trained to regain its normal function; this is often done when a patient has been given a suprapubic catheter.

**Bone Marrow:** The soft inner pulpy part of bone where blood is made.

**Brachytherapy:** Internal radiation therapy that can be given as an outpatient (high-dose-rate) or as an inpatient (low-dose-rate).

**Cancer:** A general term for more than 100 diseases characterized by uncontrolled, abnormal growth of cells in different parts of the body that can spread to other parts of the body.
Cancer Staging: A method to describe the extent of cancer, using such characteristics as the size of the tumor, the depth of invasion, and where it has spread.

Carboplatin: A chemotherapy drug used to fight cervical cancer. Also called Paraplatin.

Carcinogens: Substances known to cause and/or to promote cancer.

Carcinoma: One of the basic types of cancer in which the cancerous tumor begins in the tissues that line the skin and mucous membrane in the cervix, ovaries, lungs, glands, etc.

Cell: The basic structure of living tissues; all plants and animals are made of one or more cells.

Cerclage: Purse-string suture placed around the cervix to prevent miscarriage or premature labor in women with a compromised uterus.

Cervix: The neck of the uterus; largely a connective tissue structure, it dilates during labor, enabling the fetus to pass through the birth canal.

Cesarean Section: Method of delivering a baby through an incision in the uterus.

Chemotherapy: Treatment or control of cancer using anticancer drugs that destroy cancer cells by interfering with their growth and/or preventing their reproduction.

Cisplatin: A chemotherapy drug used to fight cervical cancer; cisplatin is the radiation sensitizer of choice for patients with locally advanced tumors, and the combination of cisplatin plus topotecan (Hycamtin) is the only US FDA-approved chemotherapy cocktail for patients with advanced or relapsing cervical cancer.

Clinical Trial: A controlled study that may be conducted to test promising, new treatments of a certain type of cancer; patients voluntarily choose either to participate or decline involvement in a given trial.

Columnar: Name of the type of cells that line the canal of the cervix and have a tall, column-like shape.

Combination Chemotherapy: Two or more different anticancer drugs used together to treat cancer.

Complete Blood Count: A test to check the number of red cells (hematocrit and hemoglobin level), white cells (white blood cell count and absolute neutrophil count), and platelets (platelet count) in a sample of blood.

Comprehensive Cancer Center: To be recognized as such by the National Cancer Institute, such a facility must demonstrate expertise in each of these areas: laboratory, clinical, behavioral, and population-based research; a full listing of comprehensive cancer centers in the US appears at the end of this booklet.

Conization or Cone Biopsy: An excisional biopsy of the diseased portion of the cervix that is performed with a scalpel and suture material in the operating room.

Corpus: The body of the uterus.

Cryotherapy: Method of treating cervical dysplasia by freezing the tissues. It is performed on an outpatient basis.
CT or CAT Scan (Computerized Axial Tomography): A diagnostic procedure that combines an x-ray with a computer to produce highly detailed, cross-sectional, three-dimensional pictures of the entire body. These tests are generally 100 times more sensitive than x-rays.

Cystoscopy: A visual examination of the interior of the bladder using a lighted tubular instrument (a cystoscope).

Cytotoxic Drug: A drug that kills specific cells in the body.

Deep Venous Thrombosis, DVT: A blood clot in the leg or pelvic veins that can cause swelling, pain, and fever; a more serious complication occurs when a part of this clot dislodges and travels to the lungs as a pulmonary embolus.

Diagnosis: The procedure by which a disease is identified.

Dysplasia: Precancerous changes of the cervix.

Early-Stage Cervical Cancer: Stages IA1–IB1 cervical cancer.

Endometrial Cancer: The most common uterine cancer among American women; it can develop if estrogen is given alone (as in estrogen replacement therapy) and not combined with progesterone (as in hormone replacement therapy).

Endometrium: The inner lining of the uterus that responds to estrogen therapy.

Epithelial: Type of tissue lining the skin, the cervix, and hollow organs.

Estrogen: Female sex hormone secreted primarily by the ovaries that is responsible for secondary sex characteristics, such as the growth of breasts.

Fistula: An opening between two spaces in the body (eg, between the bladder and the vagina or between the rectum and the vagina). It can be caused by cancer or surgery or by the late effects of radiation therapy.

Foley Catheter: A tube that is used during and after surgery to collect urine into a small bag from which measurements of its volume can be made.

Fundus: The portion of the uterine corpus that generates most of the contractile force of the uterus.

Gardasil: A US FDA-approved vaccine to prevent cervical cancer, manufactured by Merck.

Gene: The biologic unit of heredity that determines the traits a person gets from past generations.

Growth Factor Medications: These medications help boost the body’s red blood cells (eg, Epogen, Procrit, Aranesp) or white blood cells (Neulasta, Leukine, Neupogen).

Hemoglobin: The substance inside red blood cells that binds to oxygen and carries it from the lungs to the tissues; a desirable hemoglobin level for someone receiving cancer therapy is 12 g/dL.

Hormone Replacement Therapy: Medication containing one or more female hormones, commonly estrogen or estrogen plus progestin (a synthetic form of progesterone) to treat symptoms of menopause.
**Hospice:** Program for caring for terminally ill patients with a life expectancy of less than 6 months that focuses on improving the quality of remaining life.

**HPV6 and HPV11:** Type of HPV that is associated with the majority of cases of genital warts.

**HPV16 and HPV18:** Type of HPV associated with the majority of cases of severe dysplasia and invasive cervical cancer.

**Human papillomavirus (HPV):** The virus that causes cervical cancer.

**Hysterectomy:** Surgical removal of the uterus.

**Incision:** The cut that is made on the abdominal wall or in the vagina when starting an operation.

**Incentive Spirometer:** A device used by the patient to keep the lungs clear; the spirometer provides visual feedback when inhalation reaches a desired volume.

**Infusion Center:** A place in a cancer center where patients receive chemotherapy infusions on an outpatient basis.

**Intravenous:** The route of administration of fluids or medications (including chemotherapy drugs) using the veins.

**Intravenous Pyelogram (IVP):** A radiologic test using dye to look at the kidneys and ureters.

**Invasive:** Growing into and destroying normal tissues.

**Laparoscopy:** Examination of the abdominal organs with a laparoscope (a lighted tubular instrument) passed through a small incision in the abdominal wall.

**Laparotomy:** Any surgical procedure that involves opening the abdominal cavity for examination (exploratory laparotomy) or to perform additional surgery.

**LEEP (Loop Electrosurgical Excision Procedure):** Using a thin, loop wire electrode that is attached to an electrosurgical generator, which transmits a painless electrical current, the affected cervical tissue in the immediate area of the loop wire is cut away.

**Lesion:** Any diseased or abnormal area on the body; often used to describe a visible tumor or spot on the cervix that may represent disease, as in an infection, a traumatic injury, precancerous changes, or an actual cancer.

**LLETZ (Large Loop Excision of the Transformation Zone):** Excisional biopsy of the cervix performed with an electric current in the office. This is similar to a LEEP.

**Locally Advanced Cervical Cancer:** Stages IB2–IVA cervical cancer.

**Lymph Nodes:** Small glands located throughout the body that filter out and destroy bacteria and which can collect cancer cells.

**Lymphadenectomy:** Surgical removal and biopsy of lymph nodes to determine the spread of cancer.

**Lymphatics:** Channels that lead from an organ to the lymph nodes.

**Malignant:** Cancerous.
**Menopause:** The time in a woman’s life when the ovaries stop producing estrogen and the woman stops having menstrual periods.

**Metaplasia (metaplastic):** The process where one mature cell type is replaced by another mature cell type (eg, columnar cells by squamous cells in the transformation zone of the cervix).

**Metastasis (metastasized):** The spread of cancer from one part of the body to another.

**Metastatic Cervical Cancer:** Stage IVB cervical cancer.

**MRI (Magnetic Resonance Imaging):** A sophisticated technique to examine the body using powerful electromagnets, radiofrequency waves, and a computer to produce internal pictures of the body.

**Narcotic Pain Medication (outpatient):** Examples of some of the drugs given to help manage pain caused by cancer or by surgery include Vicodin, Percocet, and Darvocet, as well as **morphine** in the form of tablets (eg, Oramorph, OxyContin), liquids (eg, Roxanol), or patches (eg, Fentanyl).

**Nephrotoxic:** When a chemotherapy drug can injure the kidneys.

**Neurotoxic:** When a chemotherapy drug can injure the brain and/or the nerves.

**Neutropenia:** A drop in the number of bacteria-fighting cells.

**Oncogene:** A hereditary unit that controls the growth of cancer cells.

**Oncologist:** A doctor who specializes in the diagnosis and treatment of cancer.

**Oophorectomy:** Surgical removal of one (unilateral) or both (bilateral) ovaries.

**Operating Room:** Typically located in a hospital, this is the place where major surgical procedures are carried out, such as removal of a tumor; outpatient surgical facilities also exist for minor procedures.

**Paclitaxel:** A chemotherapy drug used to fight cervical cancer.

**Palliation:** Relief of symptoms and suffering caused by cancer and other life-threatening diseases; palliation helps a patient feel more comfortable and improves quality of life but does not cure the disease.

**Pap (Papanicolaou) Smear:** The microscopic examination of cells from the vagina or the cervix of the uterus.

**Parametria:** The tissues and ligaments at the sides of the cervix.

**Pathologist:** A doctor who examines tissues under the microscope that were removed at surgery or at biopsy.

**Patient-Controlled Analgesia (PCA):** This is a pain pump used frequently after surgery that allows the patient to push a button to receive a dose of morphine, Demerol, or Dilaudid; built-in safety limits prevent a patient from overdosing.

**Pelvis:** The part of the body within the lower abdomen that contains the uterus, ovaries, fallopian tubes, bladder, and rectum.
**Peripheral Nerves:** Those nerves that arise along the spinal cord and go out along the arms and legs, leading to the hands and feet, respectively.

**Peripheral Neuropathy:** Nerve damage caused by some chemotherapy drugs.

**Platelets:** Blood cells responsible for blood clotting.

**Platelet Count:** An ideal platelet level is greater than 150,000 per cubic millimeter (mm$^3$) of blood. A normal platelet count in a healthy person is between 150,000 and 400,000 per mm$^3$ of blood.

**Positron Emission Tomography (PET) Scanning:** An imaging test that uses radioactive sugar molecules to identify abnormal physiology in the body.

**Proctoscopy:** A visual examination of the interior of the rectum using a lighted tubular instrument that distends the rectum through inflation (a proctoscope).

**Progesterone:** A hormone that counteracts the stimulatory effects of estrogen on the inner lining of the uterus (endometrium).

**Prognosis:** A prediction about the possible outcome of a disease.

**Pulmonary Embolus:** The dislodgement of a blood clot from within a vein where the blood has “clogged up,” resulting in a blockage by the blood clot of an important blood vessel in the lungs; this can be fatal.

**Radiation Cystitis:** Injury to the bladder resulting from radiation therapy that may show up as blood in the urine.

**Radiation Oncology Unit/Suite:** A place in the cancer center where radiation therapy is given as well as high–dose-rate internal radiation therapy, both on an outpatient basis.

**Radiation Proctitis:** Injury to the rectum resulting from radiation therapy; it may be characterized by rectal bleeding.

**Radiation Sensitizer:** A chemotherapy drug that is used together with external radiation therapy to make the tumor more sensitive to the effects of radiation; the drug of choice is intravenous cisplatin.

**Radiation Therapy:** X-ray treatments focused on a specific part of the body where a tumor is growing.

**Radical Abdominal Hysterectomy with Bilateral Pelvic Lymphadenectomy:** Often, the procedure of choice for many early-stage cervical cancers.

**Radical Hysterectomy:** Removal of the uterus (body and cervix), upper vagina, and parametrial tissues.

**Radical Trachelectomy:** Removal of the cervix, upper vagina, and parametrial tissues.

**Radioactive:** Emitting energy in the form of waves or particles.

**Recurrence:** Reappearance of a cancer.

**Red Blood Cells:** Cells that carry oxygen to various parts of the body.
Remission: The decrease in, or disappearance of, disease.

Self-Catheterization: The process of a patient inserting a thin plastic straw through the urethra and into the bladder to remove the urine that has built up; this may be taught to those patients who after a radical hysterectomy have trouble voiding and do not have or want a suprapubic catheter.

Sentinel Lymph Node: The first lymph node to receive lymphatic drainage from a tumor.

Sequential Compression Devices (leg squeezers): These devices are used during and after surgery to keep blood from turning into clots in the veins of the legs.

Small Bowel Obstruction: Blockage of the small intestine due to cancer, scar tissue, or the late effects of radiation therapy.

Squamocolumnar Junction: The line of demarcation between the native (outer cervix) squamous cells and the new (metaplastic) squamous cells; this junction marks the distal boundary of the transformation zone.

Squamous: The type of cells that have a flat shape and cover the outside of the cervix as well as the vagina and vulva.

Staging: see Cancer Staging.

Steroids: Usually given in the form of Decadron (dexamethasone), steroids are used to prevent allergic reactions to certain chemotherapy drugs and to help counteract nausea caused by some chemotherapy; betamethasone or dexamethasone may also be given to pregnant women with cervical cancer, to accelerate maturation of the baby’s lungs so delivery can occur as soon as possible, allowing cervical cancer to be treated.

Suprapubic Catheter: A catheter placed into the bladder at the time of radical hysterectomy that exits through a small hole in the abdomen to one side of the surgical incision.

Thrombocytopenia: A drop in the number of platelets, which are blood cells responsible for clotting.

Topotecan: A chemotherapy drug used to fight cervical cancer; the combination of topotecan with cisplatin is the only US FDA-approved chemotherapy cocktail that is given to women with advanced or relapsing cervical cancer. Also called Hycamtin.

Total Pelvic Exenteration: An ultraradical operation used to treat patients with a centrally located recurrent cervical cancer with no signs of spread outside the pelvis; the operation requires removal of the uterus, cervix, vagina, and parametria, along with the bladder and rectum.

Transformation Zone: The area where the columnar cells of the cervical canal are replaced with the squamous cells that cover the outer cervix.

Tumor: An abnormal growth of cells that can be benign or malignant.

Ureter: Tube that drains the kidneys to the bladder.
**Uterus:** Composed of the body (*corpus*) and the neck (*cervix*), it is a hollow female organ in which a baby grows before birth.

**Vaccine:** A substance that contains part of the antigen from an infectious agent. It protects against infection from that organism in the future by stimulating an immune response to it.

**Vaginal Dilator:** A patient-administered device that is lubricated and inserted into the vagina at bedtime to increase the size (length and width) of the vagina after radiation therapy and to keep any raw tissue from getting stuck together (adhesions) and closing off the vagina (for women who have had a new vagina made after a *total pelvic exenteration* procedure).

**Vaginal Fibrosis:** Shortening, narrowing, and scarring of the vagina due to radiation therapy.

**Vaginal Radical Trachelectomy with Laparoscopic Pelvic Lymphadenectomy and Cerclage Placement:** The fertility-preserving procedure of choice for select cases of early-stage cervical cancer.

**Vulva:** The portion of the female anatomy that includes the labia on both sides as well as the clitoris and the area just between the vagina and the rectum (the perineum).

**White Blood Cells:** Cells responsible for fighting infection.

**X-ray:** High-energy electromagnetic waves that can penetrate the body to produce images of organs and other structures. X-rays can also destroy cancer cells.
Resources for Patients

**American Cancer Society (ACS):** The American Cancer Society is the nationwide community-based voluntary health organization dedicated to eliminating cancer as a major health problem by preventing cancer, saving lives, and diminishing suffering from cancer through research, education, advocacy, and service. [www.cancer.org](http://www.cancer.org)

**American College of Obstetricians and Gynecologists:** A professional organization of physicians who specialize in women's health care. [www.acog.org](http://www.acog.org)

**American Medical Association (AMA):** Provides information about doctors, such as when they were licensed, their specialty, and board certification. The Directory of Medical Specialists lists the qualifications of medical doctors and is usually available in medical and public libraries. [www.ama-assn.org](http://www.ama-assn.org)

**American Society of Clinical Oncology (ASCO):** A nonprofit organization representing physicians who treat cancer. ASCO is dedicated to improving cancer care and ensuring that cancer patients receive the highest level of care. It can provide referrals to gynecologic oncologists in your area. [www.asco.org](http://www.asco.org)

**CancerCare, Inc:** A national nonprofit agency dedicated to providing emotional support, information, referral, and practical assistance to people with cancer and their loved ones at no charge. [www.cancercare.org](http://www.cancercare.org)

**Cancer Information Service:** A national information and education network sponsored by the National Cancer Institute. Information is available in English and Spanish. [http://cis.nci.nih.gov](http://cis.nci.nih.gov)

**Centers for Disease Control and Prevention - Division of Cancer Prevention & Control:** The CDC is a leader in nationwide cancer prevention and control, working with national organizations, state health agencies, and other key groups to develop, implement, and promote effective cancer prevention and control practices. [www.cdc.gov](http://www.cdc.gov)

**Continental Care Force:** Continental Airlines provides free air transportation to medical patients with financial need. 281-261-6626

**Coping With Cancer magazine:** This is a bimonthly magazine for people who have been touched by cancer. Issues include patient education articles by health care professionals. [www.copingmag.com](http://www.copingmag.com)

**Corporate Angel Network:** A nonprofit organization that finds space on corporate jets for cancer patients and one attendant/family member needing transportation for treatment, consultation, and checkups at no charge to patients. [www.corpangelnetwork.org](http://www.corpangelnetwork.org)

**Gynecologic Cancer Foundation (GCF):** A not-for-profit fundraising organization established by the Society of Gynecologic Oncologists (SGO) to support ovarian cancer research, the training of cancer specialists in laboratory research, and a variety of programs for patient education and public awareness of gynecologic cancers. A list of nearby specialists in gynecologic oncology is available as well as a nationwide directory of all SGO members. [www.sgo.org/publications/gynecologic_cancer.cfm](http://www.sgo.org/publications/gynecologic_cancer.cfm)

**Gynecologic Oncology Group:** A nonprofit organization funded by the National Cancer Institute with the purpose of supporting research for the prevention and treatment of all gynecologic cancers. [www.gog.org](http://www.gog.org)
Lance Armstrong Foundation: The Foundation focuses on cancer survivorship issues for people living with, through, and beyond cancer. www.livestrong.org

Look Good . . . Feel Better: Co-sponsored by the Cosmetic, Toiletry, and Fragrance Association, the American Cancer Society, and the National Cosmetology Association, this public service program teaches women how to cope with appearance-related side effects of cancer treatment. www.lookgoodfeelbetter.org

National Cancer Institute (NCI): Provides a nationwide telephone service that answers questions and sends booklets and information about cancer for cancer patients, their families, and friends; the public; and health care professionals. www.cancernet.gov

National Cervical Cancer Coalition (NCCC): Founded in 1997, the NCCC is a grassroots nonprofit organization dedicated to serving women with, or at risk for, cervical cancer and human papillomavirus infection. www.nccc-online.org

National Coalition for Cancer Survivorship (NCCS): Raises awareness of cancer survivorship through its publications and quarterly newsletters; educates to eliminate the stigma of cancer; and advocates for insurance, employment, and legal rights for people with cancer. www.canceradvocacy.org

National Hospice and Palliative Care Organization: Founded in 1978 to promote and maintain quality hospice care and encourage support for patients and family members, this organization can provide information on local hospices. www.nhpco.org

National Women’s Information Center: Office of Women’s Health (OWH): A service of the Office of Women’s Health established in 1991 within the US Department of Health and Human Services (HHS), the OWH coordinates the efforts of all the HHS agencies and offices involved in women’s health. OWH works to improve the health and well-being of women and girls in the United States through its innovative programs by educating health professionals and motivating behavior change in consumers through the dissemination of health information. www.4woman.gov

OncoLink: The University of Pennsylvania Cancer Center Online Resource: A comprehensive information source that includes links to online discussion groups. www.oncolink.upenn.edu

Society of Gynecologic Nurse Oncologists (SGNO): An international organization of nurses and health professionals dedicated to advancing patient care, education, and research in the field of gynecologic oncology and women’s health care. www.sgno.org

Society of Gynecologic Oncologists (SGO): National medical specialty society of physicians who are trained in the comprehensive management of women with female reproductive cancers. It provides referrals to gynecologic oncologists. www.sgo.org

The Wellness Community: Provides free psychosocial support to people fighting to recover from cancer, as an adjunct to conventional medical treatment. www.thewellnesscommunity.org

Women & Cancer magazine: A new magazine that focuses on prevention, treatment, wellness, and community. www.womenandcancermag.com
Ongoing Clinical Trials

Please visit the clinical trials website of the National Cancer Institute at www.cancer.gov/clinicaltrials to learn more about the available trials in cervical cancer.

- **Gynecologic Oncology Group protocol 219 (GOG-0219)**
  Cisplatin and radiation therapy with or without tirapazamine in treating patients with cervical cancer.

- **Gynecologic Oncology Group protocol 204 (GOG-0204)**
  Comparison of four combination chemotherapy regimens using cisplatin in treatment of patients with stage IVB, recurrent or persistent cancer of the cervix.

- **Gynecologic Oncology Group protocol 76EE (GOG-0076EE)**
  Paclitaxel, topotecan, and cisplatin in treating patients with advanced, persistent, or recurrent cervical cancer.

- **Gynecologic Oncology Group protocol 222 (GOG-0222)**
  Pelvic exenteration in treating patients with recurrent cervical cancer.

- **University of California, Irvine protocol 03-33 (UC103-33)**
  Weekly IV topotecan and cisplatin with radiation therapy in cervical carcinoma.

- **Radiation Therapy Oncology Group protocol 116 (RTOG-C-0116)**
  Radiation therapy and cisplatin with or without amifostine in treating patients with stage IIIB or IVA cancer of the cervix.

- **Radiation Therapy Oncology Group protocol 417 (RTOG-0417)**
  Bevacizumab, radiation therapy, and cisplatin in treating patients with previously untreated locally advanced cervical cancer.

- **Radiation Therapy Oncology Group protocol 418 (RTOG-0418)**
  Intensity-modulated radiation therapy to the pelvis with or without chemotherapy in treating patients with endometrial or cervical cancer that has been removed by surgery.

- **Duke University Medical Center protocol 4516-04-2R1ER (DUMC-4516-04-2R1ER)**
  Cisplatin and radiation therapy with or without hyperthermia therapy for patients with cervical cancer.

- **European Organization for Research and Treatment of Cancer protocol 55994 (EORTC-55994)**
  Chemotherapy followed by surgery compared with radiation therapy plus chemotherapy in treating patients with stage IB or II cervical cancer.
Comprehensive Cancer Centers

As of 2005, the National Cancer Institute has designated 39 comprehensive cancer centers in the US. These facilities must demonstrate expertise in each of these areas: laboratory, clinical, and behavioral and population-based research.

**ALABAMA**

UAB Comprehensive Cancer Center  
University of Alabama at Birmingham  
1824 6th Avenue South, Room 237  
Birmingham, Alabama 35293-3300  
Tel: 205-934-5077

**ARIZONA**

Arizona Cancer Center  
University of Arizona  
1515 North Campbell Avenue  
Tucson, Arizona 85724  
Tel: 520-626-7685

**CALIFORNIA**

City of Hope National Medical Center  
Beckman Research Institute  
1500 East Duarte Road  
Duarte, California 91010-3000  
Tel: 626-256-HOPE (4673)

Rebecca and John Moores UCSD Cancer Center  
University of California, San Diego  
3855 Health Sciences Drive, Room 2247  
La Jolla, California 92093-0658  
Tel: 858-822-1222

Jonsson Comprehensive Cancer Center  
University of California, Los Angeles  
Factor Building, Room 8-684  
10833 Le Conte Avenue  
Los Angeles, California 90095-1781  
Tel: 310-825-5268

USC/Norris Comprehensive Cancer Center  
University of Southern California  
1441 Eastlake Avenue, NOR 8302L  
Los Angeles, California 90089-9181  
Tel: 323-865-0816

Chao Family Comprehensive Cancer Center  
University of California, Irvine  
101 The City Drive  
Building 23, Rt 81, Room 406  
Orange, California 92868  
Tel: 714-456-6310

UCSF Comprehensive Cancer Center & Cancer Research Institute  
University of California, San Francisco  
2340 Sutter Street, Box 0128  
San Francisco, California 94115-0128  
Tel: 415-502-1710

**COLORADO**

University of Colorado Cancer Center  
University of Colorado Health Science Center  
RC1-South Tower  
Mail Stop 8111, PO Box 6511  
Aurora, Colorado 80045-0511  
Tel: 303-724-3155

**CONNECTICUT**

Yale Cancer Center  
Yale University School of Medicine  
333 Cedar Street, Box 208028  
New Haven, Connecticut 06520-8028  
Tel: 203-785-4371
DISTRICT OF COLUMBIA
Lombardi Cancer Research Center
Georgetown University Medical Center
3800 Reservoir Road, NW
Washington, DC 20057
Tel: 202-687-2110

FLORIDA
H. Lee Moffitt Cancer Center & Research Institute
University of South Florida
12902 Magnolia Drive, MCC-CEO
Tampa, Florida 33612-9497
Tel: 813-615-4261

ILLINOIS
Robert H. Lurie Comprehensive Cancer Center of Northwestern University
676 N. Saint Clair Street
Suite 1200
Chicago, Illinois 60611
Tel: 312-908-5250

IOWA
Holden Comprehensive Cancer Center
University of Iowa
5970 “Z” JPP
200 Hawkins Drive
Iowa City, Iowa 52242
Tel: 319-353-8620

MARYLAND
The Sidney Kimmel Comprehensive Cancer Center at John Hopkins
401 North Broadway
The Weinberg Building, Suite 1100
Baltimore, Maryland 21231
Tel: 410-955-8822

MASSACHUSETTS
Dana-Farber/Harvard Cancer Center
Dana-Farber Cancer Institute
44 Binney Street, Room 1628
Boston, Massachusetts 02115
Tel: 617-632-4266

MICHIGAN
Comprehensive Cancer Center
University of Michigan
6302 CGC/0942
1500 East Medical Center Drive
Ann Arbor, Michigan 48109-0942
Tel: 734-936-1831

The Barbara Ann Karmanos Cancer Institute
Wayne State University School of Medicine
4100 John R Street
Detroit, Michigan 48201
Tel: 313-576-8660

MINNESOTA
University of Minnesota Cancer Center
MMC 806, 420 Delaware Street, SE
Minneapolis, Minnesota 55455
Tel: 612-624-8484

Mayo Clinic Cancer Center
Mayo Clinic Rochester
200 First Street, SW
Rochester, Minnesota 55905
Tel: 507-284-3753

MISSOURI
Siteman Cancer Center
Washington University School of Medicine
660 South Euclid Avenue,
Campus Box 8109
St Louis, Missouri 63110
Tel: 314-362-8020
NEW HAMPSHIRE
Norris Cotton Cancer Center
Dartmouth-Hitchcock Medical Center
One Medical Center Drive, Hinman
Box 7920
Lebanon, New Hampshire 03756-0001
Tel: 603-653-9000

NEW JERSEY
The Cancer Institute of New Jersey
Robert Wood Johnson University Hospital
Robert Wood Johnson Medical School
195 Little Albany Street, Room 2002B
New Brunswick, New Jersey 08903
Tel: 732-235-8064

NEW YORK
Roswell Park Cancer Institute
Elm & Carlton Streets
Buffalo, New York 14263-0001
Tel: 716-845-5772

Memorial Sloan-Kettering Cancer Center
1275 York Avenue
New York, New York 10021
Tel: 212-639-2000 or 800-525-2225

Herbert Irving Comprehensive Cancer Center
Columbia University
1130 St. Nicholas Avenue, Room 508
New York, New York 10032
Tel: 212-851-5273

NORTH CAROLINA
UNC Lineberger Comprehensive Cancer Center
University of North Carolina, Chapel Hill
School of Medicine, CB-7295
102 West Drive
Chapel Hill, North Carolina 27599-7295
Tel: 919-966-3036

Duke Comprehensive Cancer Center
Duke University Medical Center
Box 3843
Durham, North Carolina 27710
Tel: 919-684-5613

Comprehensive Cancer Center
Wake Forest University
Medical Center Boulevard
Winston-Salem, North Carolina 27157-1082
Tel: 336-716-7971

OHIO
Case Comprehensive Cancer Center
Case Western Reserve University
11100 Euclid Avenue, Wean 151
Cleveland, Ohio 44106-5065
Tel: 216-844-8562

Comprehensive Cancer Center
Arthur G. James Cancer Hospital & Richard J. Solove Research Institute
Ohio State University
A458 Starling Loving Hall
320 West 10th Avenue
Columbus, Ohio 43210
Tel: 614-293-7521

PENNSYLVANIA
Abramson Cancer Center of the University of Pennsylvania
16th Floor Penn Tower
3400 Spruce Street
Philadelphia, Pennsylvania 19104-4283
Tel: 215-662-6065

Fox Chase Cancer Center
333 Cottman Avenue
Philadelphia, Pennsylvania 19111
Tel: 215-728-2781
University of Pittsburgh Cancer Institute
UPMC Cancer Pavilion
5150 Centre Avenue, Suite 500
Pittsburgh, Pennsylvania 15232
Tel: 412-623-3205

TENNESSEE
Vanderbilt-Ingram Cancer Center
Vanderbilt University
691 Preston Research Building
Nashville, Tennessee 37232-6838
Tel: 615-936-1782

TEXAS
The University of Texas M. D.
Anderson Cancer Center
1515 Holcombe Boulevard, Box 91
Houston, Texas 77030
Tel: 713-792-2121

VERMONT
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