22.9: Disorders of the Female Reproductive System

Vaccinating Against Cancer

Can a vaccine prevent cancer? In the case of cervical cancer, it can. Cervical cancer is one of three disorders of the female reproductive system described in detail in this concept. Of the three, only cervical cancer can be prevented with a vaccine.

Figure \(\PageIndex{1}\): Getting a vaccine

Cervical Cancer

Cervical cancer occurs when cells of the cervix (neck of the uterus) grow abnormally and develop the ability to invade nearby tissues or spread to other parts of the body, such as the abdomen or lungs. Figure \(\PageIndex{2}\) shows the...
location of the cervix and the appearance of normal and abnormal cervical cells when examined with a microscope.

![Image of uterus, cervix, and vagina]

Figure 2: Cancer of the cervix

Cervical Cancer Prevalence and Death Rates

Worldwide, cervical cancer is the second most common type of cancer (after breast cancer) and the fourth most common cause of cancer death. In the United States and other high-income nations, the widespread use of cervical cancer screening has detected many cases of precancerous cervical changes and has dramatically reduced rates of cervical cancer deaths. About three-quarters of cervical cancer cases occur in developing countries, where routine screening is less likely because of cost and other factors. Cervical cancer is also the most common cause of cancer death in low-income countries.

Symptoms of Cervical Cancer

Early in the development of cervical cancer, there are typically no symptoms. As the disease progresses, however, symptoms are likely to occur. The symptoms may include abnormal vaginal bleeding, pelvic pain, or pain during sexual intercourse. Unfortunately, by the time symptoms start to occur, cervical cancer has typically progressed to a stage at which treatment is less likely to be successful.

Cervical Cancer Causes and Risk Factors

More than 90 percent of cases of cervical cancer are caused at least in part by human papillomavirus (HPV), which is a sexually transmitted virus that also causes genital warts. HPV infection can cause cervical cancer by interfering with a normal cell division. When HPV is not present, cervical cells containing mutations are not allowed to divide, so the cervix remains healthy. When HPV is present, however, cervical cells with mutations may be allowed to divide, leading to uncontrolled growth of mutated cells and the formation of a tumor.

Other risk factors for cervical cancer include smoking, a weakened immune system (for example, due to HIV infection), use of birth control pills, becoming sexually active at a young age, and having many sexual partners. However, these risk factors are less important than HPV infection. Instead, the risk factors are more likely to increase the risk of cervical cancer in individuals who are already infected with HPV. For example, among HPV-infected, current and former
smokers have roughly two to three times the incidence of cervical cancer as non-smokers. Passive smoking is also associated with an increased risk of cervical cancer but to a lesser extent.

### Diagnosis of Cervical Cancer

Diagnosis of cervical cancer is typically made by looking for microscopic abnormal cervical cells in a smear of cells scraped off the cervix. This is called a **Pap smear**. If cancerous cells are detected or suspected in the smear, this test is usually followed up with a biopsy to confirm the Pap smear results. Medical imaging (by CT scan or MRI, for example) is also likely to be done to provide more information, such as whether the cancer has spread.

### Prevention of Cervical Cancer

It is now possible to prevent HPV infection with a vaccine. The first HPV vaccine was approved by the U.S. Food and Drug Administration in 2006. The vaccine protects against the strains of HPV that have the greatest risk of causing cervical cancer. It is thought that widespread use of the vaccine will prevent up to 90 percent of cervical cancer cases. Current recommendations are to be given the vaccine between the ages of nine and 26. (All sexes should be vaccinated against HPV, because the virus may also cause cancer of the penis and certain other cancers.) The vaccine is effective only if it is given before HPV infection has occurred. Using condoms during sexual intercourse can also help prevent HPV infection and cervical cancer, in addition to preventing pregnancy and sexually transmitted infections (such as HIV).

Even for those who have received the HPV vaccine, there is still a small risk of developing cervical cancer. Therefore, it is recommended that individuals with cervix continue to be examined with regular Pap smears.

### Treatment of Cervical Cancer

Treatment of cervical cancer generally depends on the stage at which the cancer is diagnosed, but it is likely to include some combination of surgery, radiation therapy, and/or chemotherapy. Outcomes of treatment depend largely on how early the cancer is diagnosed and treated. For surgery to cure cervical cancer, the entire tumor must be removed with no cancerous cells found at the margins of the removed tissue on microscopic examination. If cancer is found and treated very early when it is still in the microscopic stage, the five-year survival rate is virtually 100 percent.

### Vaginitis

**Vaginitis** is inflammation of the vagina — and sometimes the vulva, as well. Symptoms may include a discharge that is yellow, gray, or green; itching; pain; and a burning sensation. There may also be a foul vaginal odor and pain or irritation with sexual intercourse.
Figure \(\PageIndex{3}\): The yeast *Candida albicans* — shown here growing on a culture plate — is one of the most common causes of vaginitis.

### Causes of Vaginitis

About 90 percent of cases of vaginitis are caused by infection with microorganisms. Most commonly, vaginal infections are caused by the yeast *Candida albicans* (Figure \(\PageIndex{3}\)). Such infections are referred to as vaginal candidiasis. Other possible causes of vaginal infections include bacteria, especially *Gardnerella vaginalis*, and some single-celled parasites, notably the protist parasite *Trichomonas vaginalis*, which is usually transmitted through vaginal intercourse. The risk of vaginal infections may be greater in those who wear tight clothing, are taking antibiotics for another condition, use birth control pills, or have improper hygiene. Poor hygiene allows organisms that are normally present in the stool (such as yeast) to contaminate the vagina. Most of the remaining cases of vaginitis are due to irritation by — or allergic reactions to — various products. These irritants may include condoms, spermicides, soaps, douches, lubricants, and even semen. Using tampons or soaking in hot tubs may be additional causes of this type of vaginitis.

### Diagnosis of Vaginitis

Diagnosis of vaginitis typically begins with symptoms reported by the patient. This may be followed by a microscopic examination or culture of the vaginal discharge in order to identify the specific cause. The color, consistency, acidity, and other characteristics of the discharge may be predictive of the causative agent. For example, infection with *Candida albicans* may cause a cottage cheese-like discharge with a low pH, whereas infection with *Gardnerella vaginalis* may cause a discharge with a fish-like odor and a high pH.

### Prevention of Vaginitis

Prevention of vaginitis includes wearing loose cotton underwear that helps keep the vulva dry. Yeasts and bacteria that may cause vaginitis tend to grow best in a moist environment. It is also important to avoid the use of perfumed soaps, personal hygiene sprays, and douches, all of which may upset the normal pH and bacterial balance in the vagina. To help avoid vaginitis caused by infection with *Trichomonas vaginalis*, the use of condoms during sexual intercourse is advised.
Treatment of Vaginitis

The appropriate treatment of vaginitis depends on the cause. In many cases of vaginitis, there is more than one cause, and all of the causes must be treated to ensure a cure.

- Yeast infections of the vagina are typically treated with topical anti-fungal medications, which are available over the counter. The medications may be in the form of tablets or creams that are inserted into the vagina. Depending on the particular medication used, treatment may involve one, three, or seven days of application.
- Bacterial infections of the vagina are usually treated with antibiotics. These may be taken orally as pills or applied topically to the vagina in creams.
- *Trichomonas vaginalis* infections of the vagina are generally treated with a single dose of an oral antibiotic. Sexual partners should be treated at the same time, and intercourse should be avoided for at least a week until both partners have completed treatment and been followed up by a physician.

Endometriosis

**Endometriosis** is a disease in which endometrial tissue, which normally grows inside the uterus, grows outside of the uterus (Figure `\ref{Fig4}`). Most often, the endometrial tissue grows around the ovaries, Fallopian tubes, and uterus. In rare instances, the tissue may grow elsewhere in the body. The areas of endometriosis typically bleed each month during the menstrual period, and this often results in inflammation, pain, and scarring. An estimated six to ten percent of individuals with a uterus are believed to have endometriosis. It is most common in their thirties and forties, and only rarely occurs before menarche or after menopause.

![Figure 4](https://bio.libretexts.org/Bookshelves/Human_Biology/Book%3A_Human_Biology_(Wakim_and_Grewal)/22%3A_Reproductiv…)

Figure `\ref{Fig4}`: In endometriosis, endometrial tissue may grow outside the uterus and cause health problems such as pain, bleeding, scarring, and infertility. Here the endometrial tissue is growing in the fallopian tubes, ovaries, and on the outside of the fallopian tube and uterus.

**Signs and Symptoms of Endometriosis**

The main symptom of endometriosis is pelvic pain, which may range from mild to severe. There appears to be little or no relationship between the amount of endometrial tissue growing outside the uterus and the severity of the pain. For many
with the disease, the pain occurs mainly during menstruation. However, nearly half of those affected have chronic pelvic pain. The pain of endometriosis may be caused by bleeding in the pelvis, which triggers inflammation. Pain can also occur from internal scar tissue that binds internal organs to each other.

Another problem often associated with endometriosis is infertility, or the inability to conceive or bear children. Among patients with endometriosis, up to half may experience infertility. Infertility can be related to scar formation or to anatomical distortions due to abnormal endometrial tissue. Other possible symptoms of endometriosis may include diarrhea or constipation, chronic fatigue, nausea and vomiting, headaches, and heavy or irregular menstrual bleeding.

Figure 5: Laparoscopy: visually inspecting the abdomen for endometrial growth is the most reliable way to diagnose endometriosis. The camera is inserted through the abdominal wall.

Causes of Endometriosis

The causes of endometriosis are not known for certain, but several risk factors have been identified, including a family history of endometriosis. People who have a genetic relationship with a person with endometriosis have about six times the normal risk of developing the disease themselves. It has been suggested that endometriosis results from mutations in several genes. It is likely that endometriosis is multifactorial, involving the interplay of several factors.

At the physiological level, the predominant idea for how endometriosis comes about is retrograde menstruation. This happens when some of the endometrial debris from a menstrual flow exits the uterus through the Fallopian tubes, rather than through the vagina. The debris then attaches itself to the outside of organs in the abdominal cavity, or to the lining of the abdominal cavity itself. Retrograde menstruation, however, does not explain all cases of endometriosis, so other factors are apparently involved. Suggestions include environmental toxins and autoimmune responses.

Diagnosis of Endometriosis

Diagnosis of endometriosis is usually based on self-reported symptoms and a physical examination by a doctor, often
combined with medical imaging, such as ultrasonography. The only way to definitively diagnose endometriosis, however, is through visual inspection of the endometrial tissue. This can be done with a surgical procedure called **laparoscopy**, in which a tiny camera is inserted into the abdomen through a small incision (Figure \(\PageIndex{5}\)). The camera allows the physician to visually inspect the area where endometrial tissue is suspected.

**Treatment of Endometriosis**

The most common treatments for endometriosis are medications to control the pain, and surgery to remove the abnormal tissue. Frequently used pain medications are non-steroidal inflammatory drugs (NSAIDS), such as naproxen. Opiates may be used in cases of severe pain. Laparoscopy can be used to surgically treat endometriosis, as well as to diagnose the condition. In this type of surgery, an additional small incision is made to insert instruments that the surgeon can manipulate externally in order to burn (cauterize) or cut away the endometrial growths. In younger patients who want to have children, surgery is conservative to keep the reproductive organs intact and functional. However, with conservative surgery, endometriosis recurs in 20 to 40 percent of cases within five years of the surgery. In older patients who have completed childbearing, hysterectomy may be undertaken to remove all or part of the internal reproductive organs. This is the only procedure that is likely to cure endometriosis and prevent relapses.

**Feature: My Human Body**

A Pap smear is a method of cervical cancer screening used to detect potentially pre-cancerous and cancerous cells in the cervix. It is the most widely used screening test for this type of cancer, and it is very effective. The test may also detect vaginal infections and abnormal endometrial cells, but it is not designed for these purposes.

If you are sexually active, you should start receiving routine Pap smears by age 21. Because most cases of cervical cancer are caused by infection with human papillomavirus (HPV), which is a sexually transmitted infection, there is little or no benefit to screening people who have not had vaginal intercourse. Starting at age 21, general guidelines are for Pap smears to be repeated every three years until age 50, and then every five years until age 65. Screening may be discontinued after age 65 if the last three Pap smears were normal. If a person has a complete hysterectomy so they no longer have a cervix, there is also no need for further Pap smears. On the other hand, if a person has had a history of abnormal Pap smears or cancer, they will likely be screened more frequently. Pap smears can be done safely during the first several months of pregnancy and resumed about three months after childbirth. Generally, better results are obtained if Pap smears are not done during menstruation.

If you’ve never had a Pap smear, knowing what to expect may help prepare you for the procedure. The patient lies on the examining table with their feet in “stirrups” to hold the legs up and apart. An instrument called a speculum is inserted into the vagina to hold back the vaginal walls and give access to the cervix. A tiny amount of tissue is brushed off the cervix and smeared onto a microscope slide. The speculum is then removed, and the procedure is over. The slide is later examined under a microscope for abnormal cells. Some people experience light spotting or mild diarrhea after a Pap smear, but most have no lasting effects.

Pap smears are uncomfortable and may be somewhat painful for some people. there may also be a pelvic exam where doctors insert their fingers into the vagina during the Pap smear test. If you experience pain during a Pap smear, tell your health care provider. Many steps can be taken to minimize the pain, which might include using a smaller speculum, using warm instruments and a lubricant, and applying a topical anesthetic such as lidocaine to the cervix before
obtaining the smear. Any pain is generally very brief, and the potential reward is worth it. Pap tests are estimated to reduce up to 80 percent of cervical cancer deaths. One of the lives saved could be your own.

**Review**

1. What is cervical cancer? Worldwide, how prevalent is it, and how does it rank as a cause of cancer deaths?
2. Identify the symptoms of cervical cancer.
3. What are the causes of — and risk factors for — cervical cancer?
4. What roles can Pap smears and HPV vaccines play in preventing cervical cancer cases and cervical cancer deaths?
5. How is cervical cancer treated?
6. Define vaginitis and identify its symptoms.
7. What are some of the causes of vaginitis? Which cause is responsible for most of the cases?
8. How is vaginitis diagnosed and treated?
9. What is endometriosis, and what are its symptoms?
10. Discuss possible causes of endometriosis.
11. How is endometriosis treated? Which treatment is most likely to prevent the recurrence of the disorder?
12. Which disorder below is the most likely to cause symptoms, specifically during menstruation?
   A. endometriosis
   B. cervical cancer
   C. HPV infection
   D. vaginitis
13. **True or False:** Yeast infections are normally treated with antibiotics.
14. **True or False:** In the absence of HPV, there are no mutated cells in the cervix.
15. In the case of infection with *Trichomonas vaginalis*, why is the woman’s sexual partner usually treated at the same time?

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