

Pap Test

Key Points

- A Pap test and pelvic exam are important parts of a woman's routine health care because they can detect cancer or abnormalities that may lead to cancer of the cervix (see Question 3).
- Human papillomavirus (HPV) infection is the primary risk factor for cervical cancer (see Questions 5 and 12).
- Guidelines from the American College of Obstetricians and Gynecologists recommend that women begin Pap test screening at age 21, be screened every 2 years through age 30, and then be screened every 3 years as long as their last three test results have been normal (see Question 6).
- If the Pap test shows abnormalities, further tests and/or treatment may be necessary (see Question 10).
- Women who have been vaccinated against HPVs still need to have Pap tests (see Question 15).

1. What is a Pap test?

The Pap test (sometimes called a Pap smear or cervical cytology) is a way to examine cells collected from the cervix (the lower, narrow end of the uterus). The main purpose of the Pap test is to detect cancer or abnormal cells that may lead to cancer. It can also find noncancerous conditions, such as infection and inflammation.

2. What is a pelvic exam?

In a pelvic exam, the uterus, vagina, ovaries, fallopian tubes, bladder, and rectum are felt to find any abnormality in their shape or size. During a pelvic exam, an instrument called a speculum is used to widen the vagina so that the upper portion of the vagina and the cervix can be seen.

3. Why are a Pap test and pelvic exam important?

A Pap test and pelvic exam are important parts of a woman's routine health care because they can detect abnormalities that may lead to cancer of the cervix. These abnormalities can be treated before cancer develops. Most cancers of the cervix can be prevented if women have Pap tests regularly. Also, as with many types of cancer, cancer of the cervix is more likely to be treated successfully if it is detected early.

4. Who performs a Pap test?

Doctors and other specially trained health care professionals, such as physician assistants, nurse midwives, and nurse practitioners, may perform Pap tests and pelvic exams. These individuals are often called clinicians.

5. How is a Pap test done?

A Pap test can be done in a doctor's office, a clinic, or a hospital. While a woman lies on an exam table, the clinician inserts a speculum into her vagina to widen it. A sample of cells is taken from the cervix with a wooden scraper and/or a small cervical brush. The cells are then prepared for analysis in either of two ways. In a conventional Pap test, the specimen (or smear) is placed on a glass



microscope slide and a fixative is added. The slide is then sent to a laboratory for examination. In an automated, liquid-based cytology Pap test, cervical cells collected with a brush or other instrument are placed in a vial of liquid preservative. The vial is sent to a laboratory, where an automated device prepares a thin layer of cells on a slide for analysis under a microscope.

In the United States, automated liquid-based cytology has largely replaced conventional Pap tests. One advantage is that samples can also be tested for the presence of human papillomavirus (HPV), certain types of which cause most cervical cancers. Liquid-based cytology also appears to reduce the likelihood of an unsatisfactory specimen. However, both methods appear to have a similar ability to detect cellular abnormalities.

6. How often should a woman have a Pap test?

Women should talk with their doctor about when and how often they should have a Pap test. Many doctors follow recommendations made by the American College of Obstetricians and Gynecologists (ACOG). In November 2009, ACOG released updated guidelines which recommend that women have their first Pap test at age 21. Although previous guidelines recommended that women have their first Pap test 3 years after they begin having sexual intercourse, the new, more conservative approach is now recommended by many professional groups because adolescents have a very low risk of cervical cancer and a high likelihood that cervical cell abnormalities will go away on their own. Moreover, treating abnormalities that would have gone away on their own can cause needless emotional distress. In addition, certain treatments have the potential to weaken the cervix and may slightly increase the rate of premature delivery.

According to the new ACOG guidelines, women aged 21 to 30 years should be screened every 2 years using either the standard Pap test or liquid-based cytology. Women 30 years and older who have had three consecutive negative (i.e., normal) cervical cytology test results may be screened once every 3 years with either screening test. Women older than 30 years can also be co-screened with a combination of the Pap test and an HPV test; if they receive negative results on both tests they do not need to be rescreened for at least 3 years. The ACOG guidelines also note that women with certain risk factors may need more frequent screening. These risk factors include being infected with human immunodeficiency virus (HIV), being immunosuppressed, having been exposed to diethylstilbestrol before birth, and having been treated for certain cervical abnormalities or cancer.

Women aged 65 to 70 years who have had at least three normal Pap tests and no abnormal Pap tests in the last 10 years may decide, after talking with their doctor, to stop having Pap tests. Women who have had a hysterectomy (surgery to remove the uterus and cervix) do not need to have a Pap test, unless the surgery was done as a treatment for a precancerous condition or cancer.

7. When is the best time to have a Pap test?

A woman should have this test when she is not menstruating; the best time is between 10 and 20 days after the first day of her last menstrual period. For about 2 days before a Pap test, she should avoid douching or using vaginal medicines or spermicidal foams, creams, or jellies (except as directed by a doctor) because they may wash away or hide abnormal cells. After the test, she can go back to her normal activities and return to work right away.

8. How are the results of a Pap test reported?

A doctor may simply describe Pap test results to a patient as “normal” or “abnormal.” It is important to remember that abnormal conditions rarely become cancerous. A woman may want to ask her doctor for specific information about her Pap test result and what the result means.

Most laboratories in the United States use a standard set of terms, called the Bethesda System, to report Pap test results. Under the Bethesda System, samples that have no cell abnormalities are reported as “negative for intraepithelial lesion or malignancy.” (The word lesion refers to an area of abnormal tissue.) A Pap test result may also report certain benign (non-neoplastic) findings, such as common, harmless infections or inflammation. Pap test results also indicate whether the specimen was satisfactory or unsatisfactory for examination.

The Bethesda System considers abnormalities of squamous cells (the thin, flat cells that form the surface of the cervix) and glandular cells (mucus-producing cells found in the endocervical canal [the opening in the

center of the cervix] or in the lining of the uterus) separately. (Glandular cell abnormalities are much less common than squamous cell abnormalities.) Samples with cell abnormalities are divided into the following categories, ranging from the mildest to the most severe:

Squamous cell abnormalities:

- *ASC—atypical squamous cells*. This is the most common abnormal finding in Pap tests. The Bethesda System divides this category into two groups:
 - *ASC-US—atypical squamous cells of undetermined significance*. The squamous cells do not appear completely normal, but doctors are uncertain about what the cell changes mean. Sometimes the changes are related to HPV infection (see Question 12), but they can also be caused by other factors. For women who have ASC-US, a sample of cells may be tested for the presence of high-risk HPV types. If high-risk HPV is present, colposcopy will usually be performed. On the other hand, a negative HPV test can provide reassurance that cancer or a precancerous condition is not present.
 - *ASC-H—atypical squamous cells, cannot exclude a high-grade squamous intraepithelial lesion*. The cells do not appear normal, but doctors are uncertain about what the cell changes mean. ASC-H lesions may be at higher risk of being precancerous compared with ASC-US lesions.
- *LSIL—low-grade squamous intraepithelial lesion*. Low-grade means that there are early changes in the size and shape of cells. Intraepithelial refers to the layer of cells that forms the surface of the cervix. LSILs are considered mild abnormalities caused by HPV infection. LSILs are sometimes referred to as mild dysplasia (dysplasia means abnormal cells that are not cancer but have the potential to become cancer). They may also be referred to as cervical intraepithelial neoplasia (CIN-1). (Neoplasia means an abnormal growth of cells, and the number describes how much of the thickness of the lining of the cervix contains abnormal cells—only the top layer, in this case.)
- *HSIL—high-grade squamous intraepithelial lesion*. High-grade means that there are more evident changes in the size and shape of the abnormal (precancerous) cells and that the cells look very different from normal cells. HSILs are more severe abnormalities that have a higher likelihood of progressing to cancer. HSILs include lesions with moderate or severe dysplasia or carcinoma in situ. (In carcinoma in situ, abnormal cells are present only on the surface of the cervix. Although they are not cancer, these abnormal cells may become cancer and spread into nearby healthy tissue.) HSIL lesions are sometimes referred to as CIN-2, CIN-3, or CIN-2/3, indicating that the abnormal cells occupy most of the layers of the lining of the cervix.
- Squamous cell carcinoma. Cervical cancer is when abnormal cervical squamous cells invade deeper into the cervix or to other tissues or organs. In a well-screened population, such as that in the United States, a finding of cancer on a Pap test is extremely rare.

Glandular cell abnormalities:

- *AGC—atypical glandular cells*. The glandular cells do not appear normal, but doctors are uncertain about what the cell changes mean.
- *AIS—endocervical adenocarcinoma in situ*. Precancerous cells are found in the glandular tissue.
- Adenocarcinoma. Such cancers can include not only endocervical cancer but also endometrial, extracervical, and other cancers.

9. How common are Pap test abnormalities?

About 55 million Pap tests are performed each year in the United States. Of these, approximately 3.5 million (6 percent) are abnormal and require medical follow-up.

10. What if Pap test results are abnormal?

If the Pap test shows an ambiguous or minor abnormality, the doctor may repeat the test to determine whether further follow-up is needed. Many times, cell changes in the cervix go away without treatment. In

some cases, doctors may prescribe estrogen cream for women who have ASC-US and are near or past menopause. Because these cell changes are often caused by low hormone levels, applying an estrogen cream to the cervix for a few weeks can usually help to clarify the cause of the cell changes.

Follow-up testing for some cell changes may involve a colposcopy, in which an instrument much like a microscope (called a colposcope) is used to examine the vagina and the cervix. During a colposcopy, the doctor inserts a speculum to widen the vagina and may apply a dilute vinegar solution to the cervix, which causes abnormal areas to turn white. The doctor then uses the colposcope (which remains outside the body) to observe the cervix. If colposcopy finds abnormal tissue, the doctor may perform endocervical curettage or a biopsy. A biopsy is the removal of cells or tissues from the abnormal area for examination under a microscope. Endocervical curettage is a type of biopsy that involves scraping cells from inside the endocervical canal with a small spoon-shaped tool called a curette.

If testing shows abnormal cells that have a high chance of becoming cancer, further treatment is needed. Without treatment, these cells may turn into cancer. Treatment options include the following:

- **LEEP** (loop electrosurgical excision procedure) uses an electrical current that is passed through a thin wire loop to act as a knife to remove tissue.
- **Cryotherapy** destroys abnormal tissue by freezing it.
- **Laser therapy** uses a narrow beam of intense light to destroy or remove abnormal cells.
- **Conization** removes a cone-shaped piece of tissue using a knife, a laser, or the LEEP technique.

11. What are false-positive and false-negative Pap test results?

The Pap test is a screening test and, like any such test, it is not 100 percent accurate. Although incorrect (false-positive and false-negative) results are uncommon, they can cause anxiety and can affect a woman's health.

A false-positive Pap test result means that a patient is told she has abnormal cells, but the cells are actually normal. A false-negative Pap test result means that a woman's cells are described as normal, but she actually has a significant abnormality that was not detected. A false-negative Pap test may delay the diagnosis and treatment of a precancerous condition or cancer. However, regular screening helps to compensate for false-negative results. If abnormal cells are missed at one time, chances are good that they will be detected the next time.

12. How are HPVs associated with the development of cervical cancer?

HPVs are a group of more than 150 viruses. Some types of HPV cause the common warts that grow on hands and feet. Over 30 types of HPV can be passed from one person to another through sexual contact. Some sexually transmitted HPVs cause wart-like growths on the genitals but do not lead to cancer. About 15 sexually transmitted HPVs are referred to as "high-risk" because they are more likely than other HPV types to lead to the development of cancer.

HPV infection is the primary risk factor for cervical cancer. However, although HPV infection is very common (about 6 million new genital HPV infections occur each year in the United States), only a very small percentage of women with HPV infections develop cervical cancer.

13. Who is at risk for HPV infection?

Infection with sexually transmitted HPV types is more common in younger age groups, particularly among women in their late teens and twenties. Women who become sexually active at a young age, who have multiple sexual partners, and whose sexual partners have other partners are at increased risk of genital HPV infection. Women who are infected with HIV are also at higher risk for being infected with HPVs and for developing cervical abnormalities. Most HPV infections are transient, or temporary, but sometimes an infection can remain detectable for many years.

14. Does infection with a cancer-associated type of HPV always lead to a precancerous condition or cancer?

No. Most HPV infections appear to go away on their own without causing any kind of abnormality. However, persistent infection with cancer-associated HPV types increases the risk that mild abnormalities will progress to more severe abnormalities or to cervical cancer. With regular follow-up care by trained clinicians, women with precancerous cervical abnormalities can have these abnormalities removed or treated before cancer develops.

15. Do women who have been vaccinated against HPVs still need to have Pap tests?

Yes. Pap tests continue to be essential to detect cervical cancers and precancerous changes, even in women who have been vaccinated against HPVs, because current HPV vaccines do not protect against all HPV types that cause cervical cancer. Therefore, it is important for vaccinated women to continue to undergo cervical cancer screening in accord with recommendations for women who have not been vaccinated.

16. How is HPV testing used in cervical cancer screening?

HPV testing alone is not useful for cervical cancer screening of women under 30 years of age because the rate of false-positive tests would be unacceptably high. That is, many women would be found to be infected with high-risk HPV, but in most of them the infection would clear on its own. However, the Food and Drug Administration has approved testing for DNA from high-risk HPV types in conjunction with Pap smears for routine cervical screening of women aged 30 years and older. A negative HPV DNA test increases assurance that there is very little risk of a serious abnormality developing over the next several years.

In addition, as described above (see Question 8), HPV DNA testing can help in deciding which ASC-US abnormalities need treatment. Doctors are usually able to use some of the cells collected at the time of the original Pap test for this test, so it is not necessary for a woman to undergo a second cervical cell collection procedure if her Pap test result is ASC-US.

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Related NCI materials and Web pages:

- National Cancer Institute Fact Sheet 3.20, *Human Papillomaviruses and Cancer* (<http://www.cancer.gov/cancertopics/factsheet/Risk/HPV>)
- National Cancer Institute Fact Sheet 4.21, *Human Papillomavirus (HPV) Vaccines* (<http://www.cancer.gov/cancertopics/factsheet/Prevention/HPV-vaccine>)
- *Understanding Cervical Changes: A Health Guide for Women* (<http://www.cancer.gov/cancertopics/understandingcervicalchanges>)
- *What You Need To Know About™ Cervical Cancer* (<http://www.cancer.gov/cancertopics/wyntk/cervix>)

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