

# ***Common Sexually Transmitted Diseases: Diagnosis and Treatment***

***2.0 Contact Hours***

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# Common Sexually Transmitted Diseases: Diagnosis and Treatment

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*The contents of this course are taken from the U.S. Department of Health & Human Services, National Institute of Allergy and Infectious Diseases. Learning objectives and post test have been prepared by Dr. Ratnakar P. Kini.*

## Objectives:

Upon completion of the course, the learner will be able to

1. Describe the most common sexually transmitted disease that can affect humans?
2. Discuss chlamydial infection, diagnosis, treatment and prevention
3. Discuss genital herpes infection, diagnosis, treatment and prevention
4. Discuss gonorrheal infection, diagnosis, treatment and prevention
5. Discuss human papilloma virus infection, diagnosis, treatment and prevention
6. Discuss syphilis infection, diagnosis, treatment and prevention

## Chlamydia

### OVERVIEW

Chlamydia ("kla-MID-ee-uh") is a curable sexually transmitted infection (STI). You can get chlamydial infection during oral, vaginal, or anal sexual contact with an infected partner. It can cause serious problems in men and women, such as penile discharge and infertility respectively, as well as infections in newborn babies of infected mothers.

Chlamydia is one of the most widespread bacterial STIs in the United States. The Centers for Disease Control and Prevention (CDC) estimates 2.8 million people are infected each year.

### CAUSE

Chlamydia is caused by bacteria called *Chlamydia trachomatis*.

## SYMPTOMS

Chlamydia bacteria live in vaginal fluid and in semen. About 70 percent of chlamydial infections have no symptoms, thereby naming it the "silent" disease. Symptoms usually appear within 1 to 3 weeks after you are infected. Those who do have symptoms may have an abnormal discharge (mucus or pus) from the vagina or penis or experience pain while urinating. These early symptoms may be very mild.

The bacterial infection may move inside your body if it is not treated.

- In women, bacteria can infect the cervix and urinary tract in women. If the bacteria move into the fallopian tubes, they can cause pelvic inflammatory disease (PID) .
- In men, bacteria can infect the urinary tract and the epididymis, causing epididymitis (inflammation of the reproductive area near the testicles).

PID and epididymitis are both very serious illnesses.

*C. trachomatis* also can cause inflammation of your rectum and lining of your eye (conjunctivitis or "pink eye"). The bacteria also can infect your throat if you have oral sexual contact with an infected partner.

## DIAGNOSIS

Chlamydia is easily confused with gonorrhea because the symptoms of both diseases are similar and the diseases can occur at the same time.

The most reliable ways to find out whether the infection is chlamydia are through laboratory tests.

- A health care provider may collect a sample of fluid from the vagina or penis and send it to a laboratory that will look for the bacteria.
- Another test looks for the bacteria in a urine sample and does not require a pelvic exam or swabbing of the penis. Results are usually available within 24 hours.

## TREATMENT

If you are infected with *C. trachomatis* , your health care provider will probably give you a prescription for an antibiotic such as azithromycin (taken for one day) or doxycycline (taken for 7 days). Or, you might get a prescription for another antibiotic such as erythromycin or ofloxacin.

Health care providers may treat pregnant women with azithromycin, erythromycin, or sometimes with amoxicillin. Penicillin, which health care providers often use to treat some other STIs, won't cure chlamydia.

If you have chlamydia, you should

- Take all your medicine, even after symptoms disappear, for the amount of time prescribed
- Go to your health care provider again if your symptoms do not disappear within 1 to 2 weeks after finishing all your medicine
- Not have sex until your treatment is completed and successful
- Tell your sex partners that you have chlamydia so they can be tested and treated, if necessary

These steps will help you avoid being reinfected with the bacteria. Repeated infections may increase the risks for reproductive complications.

## **PREVENTION**

The surest way to avoid getting an STI is to not have sexual contact or to be in a long-term, mutually monogamous relationship with a partner who has been tested and is not infected. You can reduce your chances of getting chlamydia or giving it to your partner by using male latex condoms correctly every time you have sexual intercourse.

Health care experts recommend all sexually active women 25 years of age and younger get chlamydia screening tests annually. They recommend an annual screening test for older women with risk factors for chlamydia (a new sex partner or many sex partners). In addition, all pregnant women should have a screening test for chlamydia.

If you have genital symptoms like burning while urinating or have a discharge, you should stop having sexual intercourse and see your health care provider immediately.

## **COMPLICATIONS**

Each year up to 1 million women in the United States develop PID, a serious infection of the reproductive organs. Twenty to forty percent of women with chlamydial infections that are not adequately treated may develop PID.

PID can cause scarring of the fallopian tubes, which can block the tubes and prevent fertilization from taking place. Researchers estimate that 100,000 women each year become infertile because of PID.

In other cases, scarring may interfere with the passage of the fertilized egg to the uterus during pregnancy. When this happens, the egg may attach itself to the fallopian tube. This is called ectopic or tubal pregnancy. This very serious condition can result in miscarriage and can cause death of the mother.

In men, untreated chlamydia may lead to pain or swelling in the scrotal area. This is a sign of inflammation of the epididymis. Though complications in men are rare, infection could cause pain, fever, and sterility.

### ***Complications in newborns***

A baby who is exposed to *C. trachomatis* in the birth canal during delivery may develop an eye infection or pneumonia. Symptoms of an eye infection, called conjunctivitis, include discharge in the eye and swollen eyelids and usually develop within the first 10 days of life.

Symptoms of pneumonia, including a cough that gets steadily worse and congestion, most often develop within 3 to 6 weeks of birth. Health care providers can treat both conditions successfully with antibiotics. Because of these risks to the newborn, many providers recommend that all pregnant women get tested for chlamydia as part of their prenatal care.

### **RESEARCH**

Scientists are looking for better ways to diagnose, treat, and prevent chlamydia. NIAID-supported scientists recently determined the genetic code, or sequence, for *C. trachomatis*. The sequence represents an encyclopedia of information about the bacteria. This accomplishment will give scientists important information as they try to develop a safe and effective vaccine. Researchers also are focusing on developing topical microbicides (preparations that can be inserted into the vagina to prevent infection) that are effective and easy for women to use.

## **Genital Herpes**

### **OVERVIEW**

Genital herpes is an infection of the genitals, buttocks, or anal area caused by herpes simplex virus (HSV). There are two types of HSV.

- HSV type 1 most commonly infects the mouth and lips, causing sores known as fever blisters or cold sores. It is also an important cause of sores to the genitals.
- HSV type 2 is the usual cause of genital herpes, but it also can infect the mouth.

According to the Centers for Disease Control and Prevention, 1 out of 5 American teenagers and adults is infected with HSV-2. Women are more commonly infected than men. In the United States, 1 out of 4 women is infected with HSV-2.

Since the late 1970s, the number of people with genital herpes infection has increased 30 percent nationwide. The largest increase has been among teens and young adults.

### **TRANSMISSION**

If you have genital herpes infection, you can easily pass or transmit the virus to an uninfected partner during sex.

Most people get genital herpes by having sex with someone who is shedding the herpes virus either during an outbreak or during a period with no symptoms. People who do not know they have herpes play an important role in transmission.

You can transmit herpes through close contact other than sexual intercourse, through oral sex or close skin-to-skin contact, for example.

The virus is spread rarely, if at all, by objects such as a toilet seat or hot tub.

### ***Reduce your risk of spreading herpes***

People with herpes should follow a few simple steps to avoid spreading the infection to other places on their body or other people.

- Avoid touching the infected area during an outbreak, and wash your hands after contact with the area.
- Do not have sexual contact (vaginal, oral, or anal) from the time of first genital symptoms until symptoms are completely gone.

## **TREATMENT**

Although there is no cure for genital herpes, your health care provider might prescribe an antiviral medicine to treat your symptoms and to help prevent future outbreaks. This can decrease the risk of passing herpes to sexual partners. Medicines to treat genital herpes are

- Acyclovir (Zovirax)
- Famciclovir (Famvir)
- Valacyclovir (Valtrex)

## **SYMPTOMS**

Symptoms of herpes are called outbreaks. The first outbreak appears within 2 weeks after you become infected and can last for several weeks. These symptoms might include tingling or sores near the area where the virus has entered the body, such as on the genital or rectal area, on buttocks or thighs, or occasionally on other parts of the body where the virus has entered through broken skin. They also can occur inside the vagina and on the cervix in women, or in the urinary passage of women and men. Small red bumps appear first, develop into small blisters, and then become itchy, painful sores that might develop a crust and will heal without leaving a scar.

Sometimes, there is a crack or raw area or some redness without pain, itching, or tingling.

Other symptoms that may accompany the first (and less often future) outbreak of genital herpes are fever, headache, muscle aches, painful or difficult urination, vaginal discharge, and swollen glands in the groin area.

Often, though, people don't recognize their first or subsequent outbreaks. People who have mild or no symptoms at all may not think they are infected with herpes. They can still transmit the virus to others, however.

### ***Recurrence of herpes outbreaks***

In most people, the virus can become active and cause outbreaks several times a year. This is called a recurrence, and infected people can have symptoms. HSV remains in certain nerve cells of your body for life. When the virus is triggered to be active, it travels along the nerves to your skin. There, it makes more virus and sometimes new sores near the site of the first outbreak.

Recurrences are generally much milder than the first outbreak of genital herpes. HSV-2 genital infection is more likely to result in recurrences than HSV-1 genital infection. Recurrences become less common over time.

Symptoms from recurrences might include itching, tingling, vaginal discharge, and a burning feeling or pain in the genital or anal area. Sores may be present during a recurrence, but sometimes they are small and easily overlooked.

Sometimes, the virus can become active but not cause any visible sores or any symptoms. During these times, small amounts of the virus may be shed at or near places of the first infection, in fluids from the mouth, penis, or vagina, or from barely noticeable sores. This is called asymptomatic (without symptoms) shedding. Even though you are not aware of the shedding, you can infect a sexual partner during this time. Asymptomatic shedding is an important factor in the spread of herpes.

## **DIAGNOSIS**

Your health care provider can diagnose typical genital herpes by looking at the sores. Some cases, however, are more difficult to diagnose.

The virus sometimes, but not always, can be detected by a laboratory test called a culture. A culture is done when your health care provider uses a swab to get and study material from a suspected herpes sore. You may still have genital herpes, however, even if your culture is negative (which means it does not show HSV).

A blood test cannot show whether you are having a herpes outbreak, but it can show if you are infected with HSV. Newer blood tests, called type-specific tests, can tell whether you are infected with HSV-1 or HSV-2. Blood tests cannot tell between genital and other herpes infections. Health experts assume, however, that if you are positive for HSV-2, you have had genital infection.

## *Coping with herpes*

A diagnosis of genital herpes can have emotional effects whether or not symptoms are present. If you have genital herpes, you are probably concerned about the effect of your disease on personal relationships. In addition, your sexual partner may be concerned about their risk of infection. Proper counseling and treatment can help you and your partner learn to cope with the disease.

## **PREVENTION**

Because herpes can be transmitted from someone who has no symptoms, using these precautions is not enough to prevent transmission. Recently, the Food and Drug Administration approved Valtrex for use in preventing transmission of genital herpes. It has to be taken continuously by the infected person, and while it significantly decreases the risk of the transmission of herpes, transmission can still occur.

- Do not have oral genital contact in the presence of any symptoms or findings of oral herpes.
- Using barriers such as condoms during sexual activity may decrease transmission, but transmission can occur even if condoms are used correctly. Condoms may not cover all infected areas.

## **COMPLICATIONS**

Genital herpes infections usually do not cause serious health problems in healthy adults. In some people whose immune systems do not work properly, genital herpes outbreaks can be unusually severe and long lasting.

Occasionally, people with normal immune systems can get herpes infection of the eye, called ocular herpes. Ocular herpes is usually caused by HSV-1 but sometimes by HSV-2. It can occasionally result in serious eye disease, including blindness.

A woman with herpes who is pregnant can pass the infection to her baby. A baby born with herpes might die or have serious brain, skin, or eye problems. Pregnant women who have herpes, or whose sex partner has herpes should discuss the situation with her health care provider. Together they can make a plan to reduce her or her baby's risk of getting infected. Babies who are born with herpes do better if the disease is recognized and treated early.

Genital herpes, like other genital diseases that cause sores, is important in the spread of HIV infection.

## **RESEARCH**

The National Institute of Allergy and Infectious Diseases (NIAID) supports research on genital herpes and HSV. Studies are currently underway to develop better treatments for



the millions of people who suffer from genital herpes. While some scientists are carrying out clinical trials to determine the best way to use existing medicines, others are studying the biology of HSV. NIAID scientists have identified certain genes and enzymes (proteins) that the virus needs to survive. They are hopeful that drugs aimed at disrupting these viral targets might lead to the design of more effective treatments.

Meanwhile, other researchers are devising methods to control the virus' spread. Two important means of preventing HSV infection are vaccines and topical microbicides.

Several different vaccines are in various stages of development. These include vaccines made from proteins on the HSV cell surface, peptides or chains of amino acids, and the DNA of the virus itself. NIAID and GlaxoSmithKline are supporting a large clinical trial in women of an experimental vaccine that may help prevent transmission of genital herpes. The trial is being conducted at more than 35 sites nationwide. For more information, click here [Herpevac Trial for Women](#) or go to [herpesvaccine.nih.gov](http://herpesvaccine.nih.gov).

Topical microbicides, preparations containing microbe-killing compounds, are also in various stages of development and testing. These include gels, creams, or lotions that a woman could insert into the vagina prior to intercourse to prevent infection.

An NIAID-supported clinical trial demonstrated that once-daily suppressive therapy using valacyclovir significantly reduces risk of transmission of genital herpes to an uninfected partner. This is the first time an antiviral medication had been shown to reduce the risk of transmission of an STI. This strategy may contribute to preventing the spread of genital herpes.

## Gonorrhea

### OVERVIEW

Gonorrhea is a curable sexually transmitted infection (STI). It is the second most commonly reported bacterial STI in the United States following [chlamydia](#). In 2004, 330,132 cases of gonorrhea were reported to the Centers for Disease Control and Prevention (CDC). When examining race and ethnicity, age, and gender, the highest rates of gonorrhea were found in African Americans, 15 to 24 years of age, and women, respectively.

Gonorrhea can spread into the uterus and fallopian tubes, resulting in [pelvic inflammatory disease \(PID\)](#). PID affects more than 1 million women in this country every year and can cause tubal (ectopic) pregnancy and infertility in as many as 10 percent of infected women. In addition to gonorrhea playing a major role in PID, some health

researchers think it adds to the risk of getting HIV (human immunodeficiency virus) infection.

## **CAUSE**

Gonorrhea is caused by bacteria called *Neisseria gonorrhoeae*. These bacteria can infect the genital tract, mouth, and rectum of both men and women. In women, however, the opening to the uterus (cervix) is the first place of infection.

## **SYMPTOMS**

The bacteria are carried in semen and vaginal fluids and cause a discharge in men and women. A small number of people may be infected for several months without showing symptoms.

For women, the early symptoms of gonorrhea often are mild. Symptoms usually appear within 2 to 10 days after sexual contact with an infected partner. When women have symptoms, the first ones may include

- Bleeding associated with vaginal intercourse
- Painful or burning sensations when urinating
- Yellow or bloody vaginal discharge

More advanced symptoms, which may indicate development of PID, include cramps and pain, bleeding between menstrual periods, vomiting, or fever.

Men have symptoms more often than women, including

- White, yellow, or green pus from the penis with pain
- Burning sensations during urination that may be severe
- Swollen or painful testicles

If left untreated, men could experience prostate complications and epididymitis (inflammation of the testicles).

Symptoms of rectal infection include discharge, anal itching, and occasional painful bowel movements with fresh blood in the feces. Symptoms typically appear 2 to 5 days after infection but could appear as long as 30 days.

## **DIAGNOSIS**

Health care providers usually use three laboratory techniques to diagnose gonorrhea.

- Staining samples directly for the bacterium
- Detecting bacterial genes or DNA in urine
- Growing the bacteria in laboratory cultures

Many providers prefer to use more than one test to increase the chance of an accurate diagnosis.

You usually can get the staining test results while in the office or clinic. This test is quite accurate for men but not so in women. Only one in two women with gonorrhea has a positive stain.

More often, health care providers use urine or cervical swabs for a new test that detects the genes of the bacteria. These tests are more accurate than culturing the bacteria.

The laboratory culture test involves placing a sample of the discharge onto a culture plate. The health care provider also can take a culture to detect gonorrhea in the throat. Culture also allows testing for drug-resistant bacteria.

## **TREATMENT**

Health care providers usually prescribe a single dose of one of the following antibiotics to treat gonorrhea.

- Cefixime
- Ceftriaxone
- Ciprofloxacin
- Ofloxacin
- Levofloxacin

If you are pregnant, or are younger than 18 years old, you should not be treated with certain types of antibiotics. Your health care provider can prescribe the best and safest antibiotic for you. Gonorrhea and chlamydia often infect people at the same time. Therefore, health care providers usually prescribe a combination of antibiotics, such as ceftriaxone and doxycycline or azithromycin, which will treat both diseases.

If you have gonorrhea, all of your sexual partners should get tested and then treated if infected, whether or not they have symptoms. Health experts also recommend that you not have sex until your infected partners have been treated.

For updated information on treatment for gonorrhea, read the [CDC STD Treatment Guidelines](#).

## **PREVENTION**

The surest way to avoid transmission of STIs is to abstain from sexual contact or be in a long-term mutually monogamous relationship with a partner who has been tested and is not infected.

By using latex condoms correctly and consistently during vaginal or rectal sexual activity, you can reduce your risk of getting gonorrhea and developing complications.

## COMPLICATIONS

In untreated gonorrhea infections, the bacteria can spread up into the reproductive tract, or more rarely, can spread into the blood stream and infect the joints, heart valves, or the brain.

The most common result of untreated gonorrhea is PID. Gonococcal PID often appears immediately after the menstrual period. PID causes scar tissue to form in the fallopian tubes. If the tube is partially scarred, the fertilized egg may not be able to pass into the uterus. If this happens, the embryo may implant in the tube causing a tubal (ectopic) pregnancy. This serious complication may result in a miscarriage and can cause death of the mother.

In men, gonorrhea causes epididymitis, a painful condition of the testicles that can lead to infertility if left untreated. Also, gonorrhea affects the prostate gland and may cause scarring in the urine canal.

Rarely, untreated gonorrhea can spread through the blood to the joints. This can cause an inflammation of the joints, which is very serious.

If you are infected with gonorrhea, your risk of getting HIV infection increases (HIV, human immunodeficiency virus, causes AIDS). Therefore, it is extremely important for you to either prevent yourself from getting gonorrhea or get treated early if you already are infected with it.

### *Complications in newborns and children*

If you are pregnant and have gonorrhea, you may give the infection to your baby as it passes through the birth canal during delivery. A health care provider can prevent infection of your baby's eyes by applying silver nitrate or other medicine to the eyes immediately after birth. Because of the risks from gonococcal infection to both you and your baby, health experts recommend that pregnant women have at least one test for gonorrhea during prenatal care.

When gonorrhea occurs in the genital tract, mouth, or rectum of a child, it is due most commonly to sexual abuse.

## RESEARCH

The National Institute of Allergy and Infectious Diseases (NIAID) continues to support a comprehensive, multidisciplinary program of research on *N. gonorrhoeae* (gonococci). Researchers are trying to understand how gonococci infect cells while evading defenses of the human immune system. Studies are ongoing to find

1. How this bacterium attaches to host cells
2. How it gets inside cells

3. Gonococcal surface structures and how they can change
4. Human response to infection by gonococci

Together, these efforts have led to, and will lead to, further improvements in diagnosis and treatment of gonorrhea. They also may lead to development of an effective vaccine against gonorrhea.

Another important area of gonorrhea research concerns antibiotic resistance. This is particularly important because strains of *N. gonorrhoeae* that are resistant to recommended antibiotic treatments have spread from Southeast Asia to Hawaii and are now starting to appear on the west coast. These events add urgency to conduct research on and develop new antibiotics and to prevent antibiotic resistance from spreading.

NIAID also supports research efforts to develop effective microbicides (antimicrobial preparations that can be applied inside the vagina) to prevent gonococcal infections.

Recently, scientists have determined the genetic code, or sequence, of the *N. gonorrhoeae* genome. They are using this information to help us better understand how the bacterium causes disease and becomes resistant to antibiotics.

## **Human Papillomavirus and Genital Warts**

### **OVERVIEW**

#### ***Human papillomavirus***

Human papillomavirus (HPV) is one of the most common causes of sexually transmitted infection (STI) in the world. Health experts estimate there are more cases of genital HPV infection than any other STI in the United States. According to the Centers for Disease Control and Prevention (CDC), approximately 6.2 million new cases of sexually transmitted HPV infections are reported every year. At least 20 million people in this country are already infected.

#### ***Genital warts***

Genital warts (sometimes called condylomata acuminata or venereal warts) are the most easily recognized sign of genital HPV infection. Many people, however, have a genital HPV infection without genital warts.

Genital warts are soft, moist, or flesh colored and appear in the genital area within weeks or months after infection. They sometimes appear in clusters that resemble cauliflower-like bumps, and are either raised or flat, small or large. Genital warts can show up in women on the vulva and cervix, and inside and surrounding the vagina and anus. In men,

genital warts can appear on the scrotum or penis. There are cases where genital warts have been found on the thigh and groin.

## **CAUSE**

More than 100 different types of HPV exist, most of which are harmless. About 30 types are spread through sexual contact and are classified as either low risk or high risk. Some types of HPV cause genital warts-single or multiple bumps that appear in the genital areas of men and women including the vagina, cervix, vulva (area outside of the vagina), penis, and rectum. These are considered low risk types. High-risk types of HPV may cause abnormal Pap smear results and could lead to cancers of the cervix, vulva, vagina, anus, or penis. Many people infected with HPV have no symptoms.

Some types of HPV cause common skin warts, such as those found on the hands and soles of the feet. These types of HPV do not cause genital warts.

## **TRANSMISSION**

Genital warts are very contagious. You can get them during oral, vaginal, or anal sex with an infected partner. You can also get them by skin-to-skin contact during vaginal, anal, or (rarely) oral sex with someone who is infected. About two-thirds of people who have sexual contact with a partner with genital warts will develop warts, usually within 3 months of contact.

In women, the warts occur on the outside and inside of the vagina, on the opening to the uterus (cervix), or around the anus.

In men, genital warts are less common. If present, they usually are seen on the tip of the penis. They also may be found on the shaft of the penis, on the scrotum, or around the anus.

Rarely, genital warts also can develop in your mouth or throat if you have oral sex with an infected person.

Like many STIs, genital HPV infections often do not have signs and symptoms that can be seen or felt. One study sponsored by the National Institute of Allergy and Infectious Diseases (NIAID) reported that almost half of women infected with HPV had no obvious symptoms. If you are infected but have no symptoms, you can still spread HPV to your sexual partner and/or develop complications from the virus.

## **DIAGNOSIS**

HPV infection is usually diagnosed based on results from an abnormal Pap smear, a primary cancer-screening tool for cervical cancer or pre-cancerous changes of the cervix. Another test to diagnose HPV infection detects the HPV DNA, which may indicate possible infection.

Your health care provider usually diagnoses genital warts by seeing them. If you are a woman with genital warts, you also should be examined for possible HPV infection of the cervix.

Your provider may be able to identify some otherwise invisible warts in your genital tissue by applying vinegar (acetic acid) to areas of your body that might be infected. This solution causes infected areas to whiten, which makes them more visible. In some cases, a health care provider will take a small piece of tissue from the cervix and examine it under the microscope.

## **TREATMENT**

There are treatments for genital warts, though they often disappear even without treatment. There is no way to predict whether the warts will grow or disappear. Therefore, if you suspect you have genital warts, you should be examined and treated, if necessary.

Depending on factors such as the size and location of your genital warts, your health care provider will offer you one of several ways to treat them.

- Imiquimod cream
- 20 percent podophyllin antimitotic solution
- 0.5 percent podofilox solution
- 5 percent 5-fluorouracil cream
- Trichloroacetic acid (TCA)

If you are pregnant, you should not use podophyllin or podofilox because they are absorbed by your skin and may cause birth defects in your baby. In addition, you should not use 5-fluorouracil cream if you are pregnant.

If you have small warts, your health care provider can remove them by one of three methods.

- Freezing (cryosurgery)
- Burning (electrocautery)
- Laser treatment

If you have large warts that have not responded to other treatment, you may have to have surgery to remove them.

Some health care providers inject the antiviral drug alpha interferon directly into warts that have returned after removal by traditional means. The drug is expensive, however, and does not reduce the rate that the genital warts return.

Although treatments can get rid of the warts, none get rid of the virus. Because the virus is still present in your body, warts often come back after treatment.

## **PREVENTION**

The only way you can prevent getting an HPV infection is to avoid direct contact with the virus, which is transmitted by skin-to-skin contact. If you or your sexual partner has warts that are visible in the genital area, you should avoid any skin-to-skin and sexual contact until the warts are treated.

Historically, research studies have not confirmed that male latex condoms prevent transmission of HPV. Recent studies, however, demonstrate that consistent condom use by male partners suggests strong protection against low and high risk types of HPV infection in women. Unfortunately, many people who don't have symptoms don't know that they can spread the virus to an uninfected partner.

## **COMPLICATIONS**

### *Cancer*

Some types of HPV can cause cervical cancer. Other types are associated with vulvar cancer, anal cancer, and cancer of the penis (a rare cancer).

Most HPV infections do not progress to cervical cancer. If you are a woman with abnormal cervical cells, a Pap smear will detect them. If you have abnormal cervical cells, it is particularly important for you to have regular pelvic exams and Pap smears so you can be treated early, if necessary.

### *Pregnancy and Childbirth*

Genital warts may cause a number of problems during pregnancy. Because genital warts can multiply and become brittle, your health care provider will discuss options for their removal, if necessary. Genital warts also may be removed to ensure a safe and healthy delivery of the newborn. Sometimes they get larger during pregnancy, making it difficult to urinate if the warts are in the urinary tract. If the warts are in the vagina, they can make the vagina less elastic and cause obstruction during delivery.

Rarely, infants born to women with genital warts develop warts in their throats (respiratory papillomatosis). Although uncommon, it is a potentially life-threatening condition for the child, requiring frequent laser surgery to prevent obstruction of the breathing passages. Research on the use of interferon therapy with laser surgery indicates that this drug may show promise in slowing the course of the disease.

## **RESEARCH**

Scientists are doing research on HPV vaccines. These vaccines are made of proteins like the ones found in human papillomavirus.



In June 2006, the Food and Drug Administration approved Gardasil, the first vaccine developed to prevent cervical cancer, precancerous genital lesions, and genital warts due to HPV. Gardasil is a vaccine that prevents infection with four HPV types: 6, 11, 16, and 18. Types 6 and 11 are low risk HPV types, associated with 90 percent of genital warts. Types 16 and 18 are high risk HPV types which together cause 70 percent of the cases of cervical cancer.

## Syphilis

### OVERVIEW

Syphilis is a sexually transmitted infection (STI) caused by a bacterium called *Treponema pallidum*. Syphilis can also be passed from mother to infant during pregnancy causing a disease called congenital syphilis. Rarely, syphilis is transmitted by means other than from a sexual partner or mother to child.

Syphilis is a disease of ancient times that is still of major importance in modern times. Although primary and secondary syphilis in the United States declined by almost 90 percent from 1990 to 2000, the number of cases rose from 5,979 in 2000 to 7,352 in 2004. There was a dramatic increase in cases in men from 2000 to 2002 that reflects syphilis in men who have sex with men. Syphilis also disproportionately affects African-Americans. HIV (human immunodeficiency virus) infection and syphilis are linked. Syphilis increases the risk of both transmitting and getting infected with HIV (the virus that causes AIDS).

### TRANSMISSION

The most common way to get syphilis is by having sexual contact with an infected person. If you get infected, you can pass the bacteria from infected skin or mucous membranes (linings), usually your genital area, lips, mouth, or anus, to the mucous membranes or skin of your sexual partner. The bacteria are fragile, and you can't get them from eating utensils or through using tubs, pools, or toilets.

### SYMPTOMS

Syphilis is sometimes called "the great imitator" because it has so many possible symptoms, and its symptoms are similar to those of many other diseases. Having HIV infection at the same time can change the symptoms and course of syphilis. Syphilis (other than congenital syphilis) occurs in four stages that sometimes overlap.

#### *Primary Syphilis*

The first symptom of primary syphilis is often a small, round, firm ulcer called a chancre ("shanker") at the place where the bacteria entered your body. This place is usually the

penis, vulva, or vagina, but chancres can also develop on the cervix, tongue, lips, or other parts of your body. Usually there is only one chancre, but sometimes they are many. Nearby lymph glands are often swollen. (Lymph glands, or nodes, are small bean-shaped organs of your immune system containing cells that help fight off germs. They are found throughout the body.) The chancre usually appears about 3 weeks after you're infected with the bacteria, but it can occur any time from 9 to 90 days after exposure.

Because chancres are usually painless and because a chancre can occur inside your body, you might not notice it. The chancre disappears in about 3 to 6 weeks whether or not you are treated. Thus, you can go through primary syphilis without symptoms or with only brief symptoms that you overlook. If, however, primary syphilis is not treated, the infection moves to the secondary stage.

### *Secondary syphilis*

Most people with secondary syphilis have a non-itchy skin rash. Although the rash is usually on the palms of your hands and soles of your feet, it may cover your whole body or appear only in a few areas. The rash appears 2 to 10 weeks after the chancre, generally when the chancre is healing or already healed. Other common symptoms include sore throat, fatigue, headache, and swollen lymph glands. Less frequent symptoms include fever, aches, weight loss, hair loss, aching joints, or lesions (sores) in the mouth or genital area.

Your symptoms may be mild. The lesions of secondary syphilis contain many syphilis bacteria, and anyone who has contact with them can get syphilis. As with primary syphilis, secondary syphilis will disappear even without treatment. Without treatment, however, the infection will move to the next stages.

You may have recurrences of secondary syphilis.

### *Latent syphilis*

The latent (hidden) stage of syphilis begins when symptoms of secondary syphilis are over.

In early latent syphilis, you may not have symptoms but the infection remains in your body. When you are in this stage, you can infect a sexual partner.

In late latent syphilis, the infection is quiet and the risk infecting a sexual partner is low or absent. If you don't get treated for latent syphilis, you will progress to tertiary syphilis, the most serious stage of the disease.

### *Tertiary syphilis*

Even without treatment, only a minority of infected people develops the dreaded complications known as tertiary, or late, syphilis. In this stage, the bacteria will damage

your heart, eyes, brain, nervous system, bones, joints, or almost any other part of your body. This damage can happen years or even decades after the primary stage. Late syphilis can result in mental illness, blindness, deafness, memory loss or other neurological problems, heart disease, and death. Late neurosyphilis (brain or spinal cord damage) is one of the most severe signs of this stage.

## **DIAGNOSIS**

It can be very difficult for your health care provider to diagnose syphilis based on symptoms. This is because symptoms and signs of the disease might be absent, go away without treatment, or be confused with those of other diseases. Because syphilis can be hard to diagnose, you should

- Visit your health care provider if you have a lesion in your genital area or a widespread rash
- Get tested periodically for syphilis if your sexual behaviors put you at risk for STIs
- Get tested to be sure you do not also have syphilis if you have been treated for another STI such as gonorrhea or HIV infection

Your health care provider can diagnose early syphilis by seeing a chancre or rash and then confirming the diagnosis with laboratory tests. Because latent syphilis has no symptoms, it is diagnosed by laboratory tests. There are two laboratory methods for making the diagnosis: by identifying the bacteria in a sample taken from a lesion and placed on a microscope slide and by performing a blood test for syphilis. If your doctor thinks you might have neurosyphilis, your spinal fluid will be tested as well.

## **TREATMENT**

Syphilis is easy to cure in its early stages. Penicillin, an antibiotic, injected into the muscle is the best treatment for syphilis. If you are allergic to penicillin, your health care provider may give you another antibiotic to take by mouth. You are more likely to need repeat treatment if you get an antibiotic other than penicillin. If you have neurosyphilis, you may need to receive daily doses of penicillin intravenously (in the vein) and may need to be treated in the hospital.

If you have late syphilis, damage done to your body organs cannot be reversed.

While you are being treated, you should abstain from sex until your sores are completely healed. You should also notify your sex partners so they can be tested for syphilis and treated if necessary.

## **PREVENTION**

To prevent getting syphilis, you must avoid contact with infected tissues and body fluids of an infected person. Most transmission of syphilis, however, is from people who have no visible sores or rashes and who do not know they are infected.

If you are uninfected and sexually active, having mutually monogamous sex with only one uninfected partner is the best way to prevent syphilis. Using condoms properly and consistently during sexual intercourse reduces the risk of getting syphilis. Washing or douching after sex will not prevent syphilis. Even if you have been treated for syphilis and cured, you can be re-infected by having sex with an infected partner.

The risk of a mother transmitting syphilis to her unborn baby during pregnancy declines with time but continues during latent syphilis. To prevent congenital syphilis, all pregnant women should be tested for syphilis.

## **COMPLICATIONS IN PREGNANCY**

Untreated syphilis results in a high risk of a bad outcome of pregnancy. Therefore, if you are pregnant, you should be tested for syphilis. Syphilis can cause miscarriages, premature births, stillbirths, or death of newborn babies. Some infants with congenital syphilis have symptoms at birth, but most develop symptoms later. Untreated babies can have deformities, delays in development, or seizures along with many other problems such as rash, fever, swollen liver and spleen, anemia, and jaundice. Sores on infected babies are infectious. Rarely, the symptoms of syphilis go unseen in infants so that they develop the symptoms of late-stage syphilis, including damage to their bones, teeth, eyes, ears, and brains, later on.

## **RESEARCH**

Developing better ways to diagnose and treat syphilis is an important research goal of scientists supported by the National Institute of Allergy and Infectious Diseases (NIAID).

Scientists are developing new tests that may provide better ways to diagnose syphilis and define the stage of infection. A high priority for researchers is developing a diagnostic test that does not require a blood sample. Researchers are evaluating saliva and urine to see whether they would work as well as blood. Researchers also are trying to develop other diagnostic tests for detecting infection in babies.

In an effort to stem the spread of syphilis, scientists are conducting research that might lead to the development of a vaccine. Molecular biologists are learning more about the various surface components of the syphilis bacterium that stimulate the immune system to respond to the invading organism.

Another high research priority is the development of a safe, effective single-dose oral antibiotic therapy for syphilis. NIAID is supporting a clinical trial that is evaluating oral azithromycin for treating primary syphilis.

NIAID-funded researchers have sequenced the genome of the bacterium that causes syphilis. The DNA sequence represents an encyclopedia of information about the bacterium. Researchers have identified clues as to how to diagnose, treat, and vaccinate against syphilis and are fueling intensive research efforts.