

Sexually transmitted disease

Sexually transmitted diseases (STD), also referred to as **sexually transmitted infections (STI)** and **venereal diseases (VD)**, are illnesses that have a significant probability of [transmission](#) between [humans](#) by means of [sexual behavior](#), including [vaginal intercourse](#), [anal sex](#) and [oral sex](#). Some STIs can also be contracted by using [IV drug needles](#) after their use by an infected person, as well as through any incident involving the contact of a wound with contaminated blood or through [childbirth](#) or [breastfeeding](#).

Sexually transmitted infections have been well known for hundreds of years, and [venereology](#) is the branch of medicine that studies these diseases. While in the past, these illnesses have mostly been referred to as STDs or VD, in recent years the term *sexually transmitted infections (STIs)* has been preferred, as it has a broader range of meaning; a person may be *infected*, and may potentially infect others, without having a *disease*.

There are 19 million new cases of sexually transmitted infections every year in the [United States](#), and, in 2005, the World Health Organization estimated that 448 million people aged 15–49 were being infected a year with curable STIs (such as [syphilis](#), [gonorrhea](#) and [chlamydia](#)).^[2]

Until the 1990s, STIs were commonly known as *venereal diseases*, the word venereal being derived from the Latin word *venereus*, and meaning relating to sexual intercourse or desire, **ultimately derived from [Venus](#), the [Roman goddess](#) of love**. *Social disease* was a phrase used as a euphemism.

Sexually transmitted infection is a broader term than *sexually transmitted disease*. **An [infection](#) is a colonization by a parasitic species, which may not cause any adverse effects.** **In a [disease](#), the infection leads to impaired or abnormal function.** In either case, the condition may not exhibit signs or symptoms. Increased

understanding of infections like [HPV](#), which infects a significant portion of sexually active individuals but cause disease in only a few has led to increased use of the term *STI*. [Public health](#) officials originally introduced the term *sexually transmitted infection*, which clinicians are increasingly using alongside the term *sexually transmitted disease* in order to distinguish it from the former. ^[5]

STD may refer only to infections that are causing diseases, or it may be used more loosely as a synonym for *STI*. Most of the time, people do not know that they are infected with an *STI* until they are tested or start showing symptoms of disease. Moreover, the term *sexually transmissible disease* is sometimes used since it is less restrictive in consideration of other factors or means of transmission. For instance, [meningitis](#) is transmissible by means of sexual contact but is not labeled an *STI* because sexual contact is not the primary [vector](#) for the [pathogens](#) that cause meningitis. This discrepancy is addressed by the probability of infection by means *other than sexual contact*. In general, an *STI* is an infection that has a negligible probability of transmission by means other than sexual contact, but has a realistic means of transmission by sexual contact (more sophisticated means—[blood transfusion](#), sharing of [hypodermic needles](#)—are not taken into account). Thus, one may presume that, if a person is infected with an *STI*, e.g., [chlamydia](#), [gonorrhea](#), [genital herpes](#), it was transmitted to him/her by means of sexual contact.

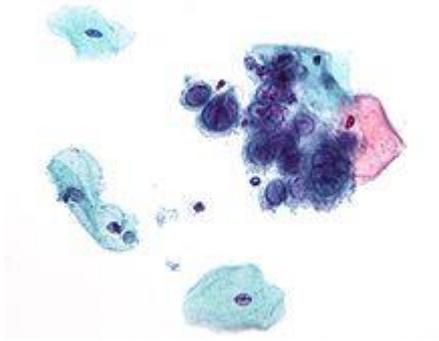
Bacterial

- [Chancroid](#) (*Haemophilus ducreyi*)
- [Chlamydia](#) (*Chlamydia trachomatis*)
- [Gonorrhea](#) (*Neisseria gonorrhoeae*), colloquially known as "the clap"
- [Granuloma inguinale](#) or (*Klebsiella granulomatis*)
- [Syphilis](#) (*Treponema pallidum*)

Fungal

- [Candidiasis](#) (yeast infection)

Viral



 **Micrograph** showing the viral [cytopathic effect](#) of herpes (ground glass nuclear inclusions, multi-nucleation). [Pap test](#). [Pap stain](#).

- [Viral hepatitis](#) ([Hepatitis B virus](#))—saliva, venereal fluids. (Note: [Hepatitis A](#) and [Hepatitis E](#) are transmitted via the [fecal-oral route](#); [Hepatitis C](#) is rarely sexually transmittable,^[19] and the route of transmission of [Hepatitis D](#) (only if infected with B) is uncertain, but may include sexual transmission.^{[20][21][22]})
- [Herpes simplex](#) ([Herpes simplex virus](#) 1, 2) skin and mucosal, transmissible with or without visible blisters
- [HIV](#) (*Human Immunodeficiency Virus*)—venereal fluids, semen, breast milk, blood
- [HPV](#) (*Human Papillomavirus*)—skin and mucosal contact. 'High risk' types of HPV cause almost all [cervical cancers](#), as well as some [anal](#), [penile](#), and [vulvar cancer](#). Some other types of HPV cause [genital warts](#).
- [Molluscum contagiosum](#) ([molluscum contagiosum virus](#) MCV)—close contact

Parasites

- [Crab louse](#), colloquially known as "crabs" or "pubic lice" (*Pthirus pubis*)
- [Scabies](#) (*Sarcoptes scabiei*)

Protozoal

- [Trichomoniasis](#) (*Trichomonas vaginalis*), colloquially known as "trich"

Main types

Sexually transmitted infections include:

- [Chlamydia](#) is a sexually transmitted infection caused by the bacterium [Chlamydia trachomatis](#). In women, symptoms may include abnormal vaginal discharge, burning during urination, and bleeding in between periods, although most women do not experience any symptoms. Symptoms in men include pain when urinating, and abnormal discharge from their penis. If left untreated in both men and women, Chlamydia can infect the urinary tract and potentially lead to [pelvic inflammatory disease](#) (PID). PID can cause serious problems during pregnancy and even has the potential to cause infertility. It can cause a woman to have a potentially deadly ectopic pregnancy, in which the child is born outside of the uterus. However, Chlamydia can be cured with antibiotics.
- The two most common forms of [herpes](#) are caused by infection with [herpes simplex virus](#) (HSV). HSV-1 is acquired orally and causes cold sores. HSV-2 is acquired during sexual contact and affects the genitals. Some people are asymptomatic or have very mild symptoms. Those that do experience symptoms usually notice them 2 to 20 days after exposure which last 2 to 4 weeks. Symptoms can include small fluid-filled blisters, headaches, backaches, itching or tingling sensations in the genital or anal area, pain during urination, [Flu like symptoms](#), swollen glands, or fever. Herpes is spread through skin contact with a person infected with the virus. The virus affects the areas where it entered the body. This can occur through kissing, vaginal intercourse, oral sex or anal sex. The virus is most infectious during times when there are visible symptoms, however those who are asymptomatic can still spread the virus through skin contact. The primary attack is the most severe because the body does not have any antibodies built up. After the primary attack, one might have recurring attacks that are milder or might not even have future attacks. There is no cure for the disease but there are antiviral medications that treat its symptoms and lower the risk of transmission ([Valtrex](#)). Although HSV-1 is typically the "oral" version of the virus, and HSV-2 is typically the

"genital" version of the virus, a person with HSV-1 orally CAN transmit that virus to their partner genitally. The virus, either type, will settle into a nerve bundle either at the top of the spine, producing the "oral" outbreak, or a second nerve bundle at the base of the spine, producing the genital outbreak.

- The human papillomavirus (HPV) is the most common STI in the United States. There are more than 40 different strands of HPV and many do not cause any health problems. In 90% of cases the body's immune system clears the infection naturally within 2 years. Some cases may not be cleared and can lead to genital warts (bumps around the genitals that can be small or large, raised or flat, or shaped like cauliflower) or cervical cancer and other HPV related cancers. Symptoms might not show up until advanced stages. It is important for women to get pap smears in order to check for and treat cancers. There are also two vaccines available for women (Cervarix and Gardasil) that protect against the types of HPV that cause cervical cancer. HPV can be passed through genital-to-genital contact as well as during oral sex. It is important to remember that the infected partner might not have any symptoms.
- Gonorrhea is caused by bacterium that lives on moist mucous membranes in the urethra, vagina, rectum, mouth, throat, and eyes. The infection can spread through contact with the penis, vagina, mouth or anus. Symptoms of Gonorrhea usually appear 2 to 5 days after contact with an infected partner however, some men might not notice symptoms for up to a month. Symptoms in men include burning and pain while urinating, increased urinary frequency, discharge from the penis (white, green, or yellow in color), red or swollen urethra, swollen or tender testicles, or sore throat. Symptoms in women may include vaginal discharge, burning or itching while urinating, painful sexual intercourse, severe pain in lower abdomen (if infection spreads to fallopian tubes), or fever (if infection spreads to fallopian tubes), however many women do not show any symptoms.^[28] There are some antibiotic resistant strains for Gonorrhea but most cases can be cured with antibiotics.

- [Syphilis](#) is an STI caused by a bacterium. If acquired, syphilis needs to be treated adequately, otherwise it can cause long-term complications and death.^[29] Clinical manifestations of syphilis include the ulceration of the uro-genital tract, mouth or rectum; if left untreated the symptoms worsen. In recent years, the prevalence of syphilis has declined in Western Europe, but it has increased in Eastern Europe (former Soviet states). A high incidence of syphilis can be found in places such as [Cameroon](#), [Cambodia](#), Papua New Guinea.^[30]
- [Trichomoniasis](#) is a common STI that is caused by infection with a protozoan parasite called *Trichomonas vaginalis*.^[31] **Trichomoniasis affects both women and men, but symptoms are more common in women.**^[32] Most patients are treated with an antibiotic called **metronidazole**, which is very effective.^[33]
- [HIV](#) (human immunodeficiency virus) damages the body's immune system which interferes with fighting off disease-causing agents. The virus kills [CD4](#) cells, which are white blood cells that help fight off various infections. **HIV is carried in body fluids, and is spread by sexual activity.** **It can also be spread by contact with infected blood, breast feeding, childbirth, and from mother to child during pregnancy.**^[34] When HIV is at its most advanced stage, an individual is said to have [AIDS](#) (acquired immunodeficiency syndrome).^[35] There are different stages of the progression of and HIV infection. The stages include [primary infection](#), asymptomatic infection, symptomatic infection, and AIDS. In the primary infection stage, an individual will have flu like symptoms (headache, fatigue, fever, muscle aches) for about 2 weeks. In the asymptomatic stage, symptoms usually disappear, and the patient can remain asymptomatic for years. When HIV progresses to the symptomatic stage, the immune system is weakened, and has a low cell count of CD4+ [T Cells](#). When the HIV infection becomes life-threatening, it is called AIDS. People with AIDS fall prey to opportunistic infections and die as a result.^[23] When the disease was first discovered in the 1980s, those who had AIDS were not likely to live longer than a few years. There are

now antiretroviral drugs (ARVs) available to treat HIV infections. There is no known cure for HIV or AIDS but the drugs help suppress the virus. By suppressing the amount of virus in the body, people can lead longer and healthier lives. Even though their virus levels may be low they can still spread the virus to others.^[36]

Unscreened

There are many millions of species of bacteria, protozoa, fungi, and viruses, many which remain undocumented or poorly studied with regards to sexual transmission. Despite that the above include what are generally known as STIs, sexually transmission of microbes is far from limited to the above list. Since the sexual route of transmission is not considered common, and/or the microbe itself is not implicated in a major research study on disease, the following pathogens are simply not screened for in sexual health clinics. Some of these microbes are known to be sexually transmittable.

Pathophysiology

Many STIs are (more easily) transmitted through the [mucous membranes](#) of the [penis](#), [vulva](#), [rectum](#), [urinary tract](#) and (less often—depending on type of infection) the [mouth](#), [throat](#), [respiratory tract](#) and [eyes](#).^[40] The visible membrane covering the [head of the penis](#) is a mucous membrane, though it produces no [mucus](#) (similar to the [lips](#) of the mouth). Mucous membranes differ from [skin](#) in that they allow certain pathogens into the body.^[41] The amount of contact with infective sources which causes infection varies with each pathogen but in all cases a disease may result from even light contact from fluid carriers like venereal fluids onto a mucous membrane.

Healthcare professionals suggest [safer sex](#), such as the use of [condoms](#), as the most reliable way of decreasing the risk of contracting sexually transmitted diseases during sexual activity, but safer sex should by no means be considered an absolute safeguard. The transfer of and exposure to bodily fluids, such as [blood transfusions](#) and other blood products, sharing injection [needles](#), needle-stick injuries (when medical staff are inadvertently jabbed or

pricked with needles during medical procedures), sharing [tattoo](#) needles, and childbirth are other avenues of transmission. These different means put certain groups, such as medical workers, and [haemophiliacs](#) and drug users, particularly at risk.

Vaccines

Vaccines are available that protect against some viral STIs, such as [Hepatitis A](#), [Hepatitis B](#), and some types of [HPV](#). Vaccination before initiation of sexual contact is advised to assure maximal protection.

Nonoxynol-9

Researchers had hoped that [nonoxynol-9](#), a vaginal microbicide would help decrease STI risk. Trials, however, have found it ineffective^[44] and it may put women at a higher risk of HIV infection.^[45]

Management

High-risk exposure such as that which occurs in rape cases may be treated prophylactically using antibiotic combinations such as [azithromycin](#), [cefixime](#), and [metronidazole](#).

In 1996, the [World Health Organization](#) estimated that more than 1 million people were being infected daily. About 60% of these infections occur in young people <25 years of age, and of these 30% are <20 years. Between the ages of 14 and 19, STIs occur more frequently in girls than boys by a ratio of nearly 2:1; this equalizes by age 20. An estimated 340 million new cases of syphilis, gonorrhea, chlamydia and trichomoniasis occurred throughout the world in 1999.^[51]

Commonly reported prevalences of STIs among sexually active adolescent girls both with and without lower genital tract symptoms include [chlamydia](#) (10–25%), [gonorrhea](#) (3–18%), [syphilis](#) (0–3%), [Trichomonas vaginalis](#) (8–16%), and [herpes simplex virus](#) (2–12%).^[citation needed] Among adolescent boys with no symptoms of urethritis, isolation rates include chlamydia (9–11%) and gonorrhea

(2–3%).^[*citation needed*] At least one in four U.S. teenage girls has a sexually transmitted disease,^[52] a [CDC](#) study found.^[53] Among girls who admitted ever having sex, the rate was 40%.^[54]



Metronidazole ([AAN](#), [BAN](#), [INN](#), [USAN](#)) /[mɛtrəˈnaɪdəzou/](#) (**Flagyl** and others) is a [nitroimidazole antibiotic](#) medication used particularly for [anaerobic bacteria](#) and [protozoa](#). Metronidazole is an [antibacterial](#) against [anaerobic organisms](#), [amoebicide](#) and [antiprotozoal](#).^[3] It is the drug of choice for first episodes of mild-to-moderate [Clostridium difficile](#) infection.^[4]

Medical uses[\[edit\]](#)

Metronidazole is primarily used to treat: [bacterial vaginosis](#), [pelvic inflammatory disease](#) (along with other antibacterials like [ceftriaxone](#)),

Bacterial vaginosis[\[edit\]](#)

Drugs of choice for the treatment of [bacterial vaginosis](#) include metronidazole and clindamycin. The treatment of choice for bacterial vaginosis in non-pregnant women include metronidazole oral twice daily for seven days, or metronidazole gel intravaginally once daily for five days, or clindamycin intravaginally at bedtime for seven days. For pregnant women, the treatment of choice is metronidazole oral three times a day for seven days. Data does not report routine treatment of male sexual partners in non-pregnant or pregnant women.

Trichomoniasis[\[edit\]](#)

The 5-[nitroimidazole](#) drugs (metronidazole and [tinidazole](#)) are the mainstay of treatment for infection with trichomonas vaginalis. Treatment for both the infected patient and the patient's sexual partner is recommended, even if asymptomatic. Therapy other than 5-nitroimidazole drugs is also an option, but cure rates are much lower.^[7]

Clostridium difficile colitis[\[edit\]](#)

Initial antibiotic therapy for non-severe Clostridium difficile colitis ([pseudomembranous colitis](#)) consists of oral metronidazole or oral vancomycin. Several randomized controlled trials have demonstrated equivalent efficacy of

oral metronidazole and oral vancomycin in treating non-severe *Clostridium difficile* colitis.^{[8][9][10]} However, it has been shown that oral vancomycin is more effective in treating patients with severe *Clostridium difficile* colitis.^[8]

Infections of *Entamoeba histolytica*[\[edit\]](#)

Invasive [colitis](#) and extraintestinal disease including liver abscesses, pleuropulmonary infections, and brain abscesses can result from infection with [Entamoeba histolytica](#). Metronidazole is a widely used drug in patients with *invasivs colitis*, liver abscesses, pleuropulmonary infection, and/or brain abscesses caused by *Entamoeba histolytica*.

Preterm births[\[edit\]](#)

Metronidazole has also been used in women to prevent [preterm birth](#) associated with [bacterial vaginosis](#), amongst other risk factors including the presence of cervicovaginal fetal fibronectin (fFN). A [randomised controlled trial](#) demonstrated that metronidazole was ineffective in preventing preterm delivery in high-risk pregnant women (selected by history and a positive fFN test) and, conversely, the incidence of preterm delivery was found to be higher in women treated with metronidazole.^[11]

Adverse effects[\[edit\]](#)

Common [adverse drug reactions](#) ($\geq 1\%$ of those treated with the drug) associated with systemic metronidazole therapy include: [nausea](#), [diarrhoea](#), weight loss, abdominal pain, vomiting, headache, dizziness and metallic taste in the mouth. [Intravenous](#) administration is commonly associated with [thrombophlebitis](#). Infrequent adverse effects include: [hypersensitivity](#) reactions (rash, itch, flushing, fever), headache, dizziness, [vomiting](#), [glossitis](#), [stomatitis](#), dark urine and [paraesthesia](#).^[5] High doses and/or long-term systemic treatment with metronidazole is associated with the development of [leucopenia](#), [neutropenia](#), increased risk of [peripheral neuropathy](#) and [CNS](#) toxicity.^[5]

Common adverse drug reaction associated with topical metronidazole therapy include local redness, dryness and skin irritation; and eye watering (if applied near eyes).^[5]

There is some evidence from studies in rats that supports the possibility of metronidazole may contribute to [serotonin syndrome](#), although no case reports documenting this have been published to date.^{[12][13]}

Interaction with alcohol[\[edit\]](#)

Consuming [ethanol](#) (alcohol) while taking metronidazole has long been thought to have a [disulfiram](#)-like reaction with effects that can include [nausea](#), [vomiting](#), [flushing](#) of the skin, [tachycardia](#) (accelerated heart rate), and [shortness of breath](#).^[21] It is typically advised that consumption of alcohol should be avoided by patients during systemic metronidazole therapy and for at least 48 hours after completion of treatment.^[5] However there are studies calling into question the mechanism of the interaction of alcohol and metronidazole,^[22] ^[23]^[24] and a possible [central toxic serotonin reaction](#) for the alcohol intolerance suggested.^[12] Metronidazole is also generally thought to inhibit the liver metabolism of propylene glycol (found in some foods, medicines and in many electronic cigarette e-liquids), and thus propylene glycol may potentially have similar interaction effects with metronidazole.^[citation needed]

Mechanism of action[\[edit\]](#)

It inhibits nucleic acid synthesis by disrupting the DNA of microbial cells.^[1] This function only occurs when metronidazole is partially reduced, and because this reduction usually happens only in anaerobic cells, it has relatively little effect upon human cells or [aerobic bacteria](#).

DRUG CLASS AND MECHANISM: Estrogens are one of the two major classes of female hormones. (Progestins comprise the second major class). **Estrogens are used primarily to treat the symptoms of [menopause](#) and states in which there is a deficiency of estrogen, for example, among women who have had their estrogen-producing ovaries removed.** Conjugated estrogens are a mixture of several different estrogens (estrogen salts) that are derived from natural sources and blended to approximate the composition of estrogens in the urine of **pregnant horses**. The main components are sodium estrone sulphate and sodium **equilin** sulfate. Estrogens have widespread effects on tissues in the body. **Estrogens cause growth and development of the female sexual organs and maintain female sexual characteristics such as the growth of underarm and pubic hair, body contours, and skeleton.** Estrogens also increase secretions from the cervix and growth of the inner lining of the uterus (endometrium). Conjugated estrogens were first approved by the FDA in 1938.

PREPARATIONS: 0.625 mg/gram

STORAGE: The cream should be stored at room temperature, 15-30 C (59-86 F).

PRESCRIBED FOR: Premarin vaginal cream is used for the relief of vaginal symptoms in postmenopausal women who have developed uncomfortable [vaginal dryness](#), inflammation, or painful intercourse due to atrophy of the vagina and/or vulvae.

DOSING: The recommended dose is 0.5 to 2 grams administered daily for 21 days then off for 7 days. Twice weekly administration may also be used. [Vaginal products work best if used at bedtime](#). The hands should first be washed and the applicator filled with cream from the tube. Lying on the back with the knees bent, individuals should insert the applicator into the vagina and push the applicator's plunger to deliver the cream. The applicator and plunger then should be washed with warm, soapy water and rinsed with plain water. The hands should be washed before and after use. A small amount of the cream also can be applied to the outer skin folds or "lips" of the vagina (vulvae) to relieve dryness or irritation.

DRUG INTERACTIONS: Premarin drug interaction studies have not been conducted. [Estrogens are broken down in the liver by certain enzymes](#). Drugs that increase or decrease the activity of these enzymes may interfere with the action of Premarin. Rifampin (Rifadin), barbiturates, [carbamazepine](#) (Tegretol), griseofulvin (Grifulvin), [phenytoin](#) (Dilantin), St. John's wort, and primidone may increase the elimination of estrogen by enhancing the liver's ability to eliminate estrogens. Use of any of these medications with estrogens may result in a reduction of the beneficial effects of estrogens. Conversely, drugs such as [erythromycin](#), [ketoconazole](#) (Nizoral), [itraconazole](#) (Sporanox), and [ritonavir](#) (Norvir) may reduce the elimination of estrogens by the liver and lead to increased levels of estrogens in the blood and [increased effects](#). Grapefruit juice also may increase levels of estrogen by increasing the absorption of estrogens from the intestine. Increased levels of estrogens in the blood may result in more estrogen-related side effects.

PREGNANCY: [Estrogens should be avoided during pregnancy since they increase the risk of fetal abnormalities.](#)

NURSING MOTHERS: Estrogens are secreted in milk and cause unpredictable effects in the infant. In general, they should not be used by women who are [breastfeeding](#).

SIDE EFFECTS: Among the most common endocrine side effects are breakthrough [vaginal bleeding](#) or spotting, loss of periods or excessively prolonged periods, [breast pain](#) or enlargement, and changes in sexuality (increases or decreases in libido).