



Published on The Well Project (<https://www.thewellproject.org>)  
<https://www.thewellproject.org/hiv-information/fungal-infections>

## **Fungal Infections**

Submitted on Jan 20, 2025

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## What Are Fungal Infections?

A fungus is a kind of germ. Many fungi (plural form of fungus) exist normally in and on our bodies. Fungi also live in the environment — in soil, dust, food, water, and plants. Most fungi are harmless to humans, but there are several that can cause harmful infections, especially in people living with HIV.

## Candidiasis (Yeast Infection, Thrush, etc.)

Candidiasis is a very common fungal infection usually caused by species of *Candida* yeasts. All healthy people have this yeast. The body's [immune system](#) and bacteria generally keep *Candida* in check.

When *Candida* is not controlled, it can cause problems, such as vaginal yeast infections or thrush, which are described below.

When there is an overgrowth of *Candida*, it can cause problems in the mouth, esophagus (food pipe), or vagina (birth canal). This happens more often when the immune system is weakened by [HIV](#) or when you take antibiotics. Antibiotics can kill "good" bacteria that keep *Candida* in check.

Anti-fungal drugs called "azoles" are commonly used to treat *Candida* infections. Examples are Nizoral (ketoconazole), Diflucan (fluconazole), Sporanox (itraconazole), Vfend (voriconazole), or Noxafil (posaconazole). [Pregnant people](#) should not take these drugs by mouth because they may cause damage to the developing baby. Topical azoles used inside the vagina such as Monistat (miconazole) or Gyne-Lotrimin (clotrimazole) creams, however, are safe during pregnancy.

In addition, several of the anti-fungal drugs [interact](#) with specific HIV medications, such as the protease inhibitor Norvir (ritonavir), and some non-nucleoside reverse transcriptase inhibitors, such as Sustiva (efavirenz), Viramune (nevirapine), Edurant (rilpivirine), and Intelence (etravirine). Talk to your healthcare provider before using anti-fungal drugs.

Candidiasis can come back over and over again. Some healthcare providers prescribe anti-fungal drugs on a long-term basis, but this can lead to drug-resistant species of *Candida* that are more difficult to treat.

## **Candidiasis of the Vagina (Vaginal Candidiasis, Vaginitis, or Yeast Infection)**

- May occur with normal [CD4 cell](#) counts (above 500), but more likely to develop at lower CD4 counts
- Symptoms may include itching, burning, and pain around the vagina, labia (vaginal lips), or anal area and thick, whitish, sometimes curd-like vaginal discharge
- Antibiotics, poorly controlled diabetes, steroids, [birth control](#) pills, and foods high in sugars or starches (breads, pastas, and alcohol) all promote the growth of *Candida*
- Douching reduces levels of "good" bacteria in the vagina and is not recommended
- Alcohol and nicotine (in tobacco products) promote the growth of yeast
- Because yeast grows best in moist areas, wearing looser-fitting pants or underwear can help prevent yeast infections. Cotton underwear "breathes" better than underwear made of polyester or nylon; it therefore can help reduce the growth of yeast.

### **Treatment:**

- Local treatment with over-the-counter creams such as Monistat, Gyne-Lotrimin or Mycelex (clotrimazole) or prescription anti-fungal creams
- For difficult-to-treat infections, oral prescription anti-fungal drugs may be needed
- [Complementary treatment](#): Acidophilus, which is a live bacterial culture found in oral supplements, yogurt or kefir (a cultured milk beverage), as well as in vaginal suppositories

## **Candidiasis of the Mouth (Thrush)**

- Usually occurs with CD4 cell counts below 300, but can also occur at higher CD4 counts
- Symptoms include whitish coating of the tongue and/or the inside of the cheeks
- May affect appetite and make food taste funny
- More likely to occur in diabetics (people with high blood sugar) and when steroid medications, such as prednisone or certain asthma inhalants, are taken
- Because sugar is food for *Candida* and helps it grow, limiting how much sugar you eat can help prevent thrush. Sugars are found in foods such as candies and sweets, soft drinks, fruit juices, and maple syrup. Read food labels to help you limit other forms of sugar, including corn syrup,

fructose, and glucose.

- Eating yogurt or drinking kefir (a cultured milk beverage) with active, live bacterial cultures such as *acidophilus* can help prevent thrush. These "friendly" or "good" bacteria can help control the growth of *Candida*.

### Treatment:

- Local treatment with clotrimazole lozenges (pills that dissolve in your mouth)
- Oral (taken by mouth) anti-fungal medications that work throughout the body
- Medicated anti-fungal mouthwash that you swish around your mouth and swallow
- In severe cases, IV medicines (infusions) are used
- Alternative treatments (use along with medications above):
  - Saltwater rinse using 1/2 teaspoon salt in 1 cup warm water
  - Placing lemon juice in the mouth several times a day

### Candidiasis of the Esophagus (Esophageal Candidiasis)

- Usually occurs at very low CD4 cell counts (less than 100)
- Is an [AIDS-defining opportunistic infection](#)
- Major symptom is painful swallowing or feeling like food is sticking in your throat or chest
- Often diagnosed by taking your history and a clinical exam, can be confirmed by gastrointestinal endoscopy (a lighted tube inserted through your mouth into your food pipe) or by swallowing a white, chalky substance called barium that can then be seen on an x-ray
- Possible in anyone who has thrush and a low CD4 cell count, but can occur even when no thrush can be seen in the mouth

### Treatment:

- Oral anti-fungal medications; fluconazole is most commonly used
- Intravenous anti-fungal medicines can be used if the condition is severe or if you are unable to swallow

### Cryptococcal Meningitis

The fungus *Cryptococcus neoformans* is very common. It is found in soil and bird droppings (bird poop). While most people have been exposed to this fungus, their immune systems prevent *Cryptococcus* from causing disease.

In people with weakened immune systems, especially people living with HIV who have fewer than 100 CD4 cells, *Cryptococcus* can cause a serious infection called meningitis – an inflammation or swelling of the lining of the spinal cord and brain. If it is not treated quickly and correctly, cryptococcal meningitis can cause coma or death. It can also cause infections in the lungs and throughout the body.

### Symptoms:

- Fever
- Headache
- Vision problems
- Confusion
- Nausea
- Vomiting
- Stiff neck
- Skin lesions (sores)

It is very important to let your healthcare provider know if you experience any of these symptoms.

### **Diagnosis:**

- Spinal tap (small needle inserted between bones in the back) to gather and test a small sample of the fluid that surrounds the brain and spine
- Blood tests may show a high level of cryptococcal antigen, or the yeast may be grown in culture

### **Treatment:**

- In most cases, a two-week regimen of intravenous amphotericin B (an infusion) and 5-flucytosine (a pill taken by mouth) is used
- Afterwards, oral fluconazole is used daily to prevent the disease from returning
- Fluconazole can be stopped after at least one year of treatment, if the viral load has been undetectable and the CD4 cell count has been 100 or more for three months or longer
- In milder cases of meningitis in resource-limited areas, oral fluconazole is sometimes used from the beginning

## **Histoplasmosis**

Histoplasmosis is caused by infection with the *Histoplasma capsulatum* fungus, which is common in the soil of the Mississippi and Ohio River valleys, the Caribbean, and Central and South America. A variation of the fungus is also found in Central and West Africa.

In a healthy person, the infection is usually limited to the lungs and causes only mild symptoms. In people living with HIV who have low CD4 cell counts (below 200), the infection can be life-threatening. However, histoplasmosis is one of the most common opportunistic infections among people living with HIV in the US.

### **Symptoms:**

- Fever
- Fatigue (extreme tiredness)
- Shortness of breath
- Cough
- Weight loss
- Skin lesions (sores)

### **Diagnosis:**

- Finding the organism in a sample of blood, bone marrow, lung washings, sputum (spit), or other tissue

### **Treatment:**

- Initial treatment with intravenous amphotericin B, then switch to long-term treatment with oral itraconazole (sometimes fluconazole)

## **Aspergillosis**

Aspergillosis is caused by *Aspergillus*, a very common mold (type of fungus). In people with healthy immune systems, it usually causes no symptoms but can result in allergic lung problems. In people with weakened immune systems, it can be life-threatening. Aspergillosis was more common in the earlier

days of AIDS. Today, it is rarely seen in people living with HIV in the US.

### **Symptoms:**

- Pain in the sinuses, nose, or ear canal
- Facial swelling
- Pneumonia-type symptoms such as cough, difficulty breathing, and fever

### **Diagnosis:**

- Lung washings, sputum or nasal secretions that grow *Aspergillus* in culture

### **Treatment:**

- Intravenous amphotericin B, or intravenous or oral voriconazole

## **Coccidioidomycosis (Valley Fever)**

Coccidioidomycosis, commonly called Valley Fever, is a fungal infection caused by either *Coccidioides immitis* or *Coccidioides posadasii*. These fungi grow in soil found in the southwestern United States, Mexico, and Central and South America. You acquire the condition by breathing fungal particles (spores) into your lungs, where the infection starts.

In people with healthy immune systems, coccidioidomycosis causes mild to moderate lung problems. In those with weakened immune systems, it can cause more serious lung problems and also spread to other areas, including the skin, bones, lining of the brain and spinal cord, and lymph nodes.

### **Symptoms:**

- Fever
- Headache
- Stiff neck
- Backache
- Cough
- Fatigue
- Joint stiffness and pain
- Small, tender, raised, red bumps under the skin called erythema nodosum

### **Diagnosis:**

- Blood tests to look for *Coccidioides* antigens or antibodies
- Finding the organism in sputum (spit) or other tissue

### **Treatment:**

- Intravenous (IV) amphotericin B for severe lung infection or infection which has spread outside of the lungs, this is followed by oral fluconazole
- In very mild cases of coccidioidomycosis, in those without a clear focal site of infection or a mild lung infection, oral fluconazole is sometimes used from the beginning

## **Conclusion**

Fungal infections can be very serious for people living with HIV. However, serious fungal infections are

most common among people not on HIV treatment or who have low CD4 cell counts (especially fewer than 100). The best way to prevent fungal infections from occurring is to keep the immune system healthy by using HIV drugs and seeing your healthcare provider regularly.

## Additional Resources

Select the links below for additional material related to fungal infections.

- [Yeast Infections during Pregnancy \(BabyCenter\)](#)
- [Fungal Diseases: People Living with HIV/AIDS \(US Centers for Disease Control and Prevention\)](#)
- [HIV and Fungal Infections \(Wellness\)](#)
- [The 4 Most Common Fungal Infections in People With HIV \(verywellHealth\)](#)
- [Candidiasis \(Thrush, Yeast Infection\) \(POZ\)](#)
- [Yeast Infections – Vaginal \(CATIE\)](#)
- [Fungal Infections \(MedlinePlus\)](#)
- [Candidiasis \(Thrush\) \(aidsmap\)](#)
- [The Facts About HIV and Thrush \(verywellHealth\)](#)
- [Histoplasmosis \(POZ\)](#)
- [Valley Fever \(Coccidioidomycosis\) Risk & Prevention \(US Centers for Disease Control and Prevention\)](#)
- [Coccidioidomycosis \(POZ\)](#)
- [Cryptococcus: Screening for Opportunistic Infections Among People Living With HIV \(AIDSmap\)](#)
- [HIV and Infections \(MedlinePlus\)](#)



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