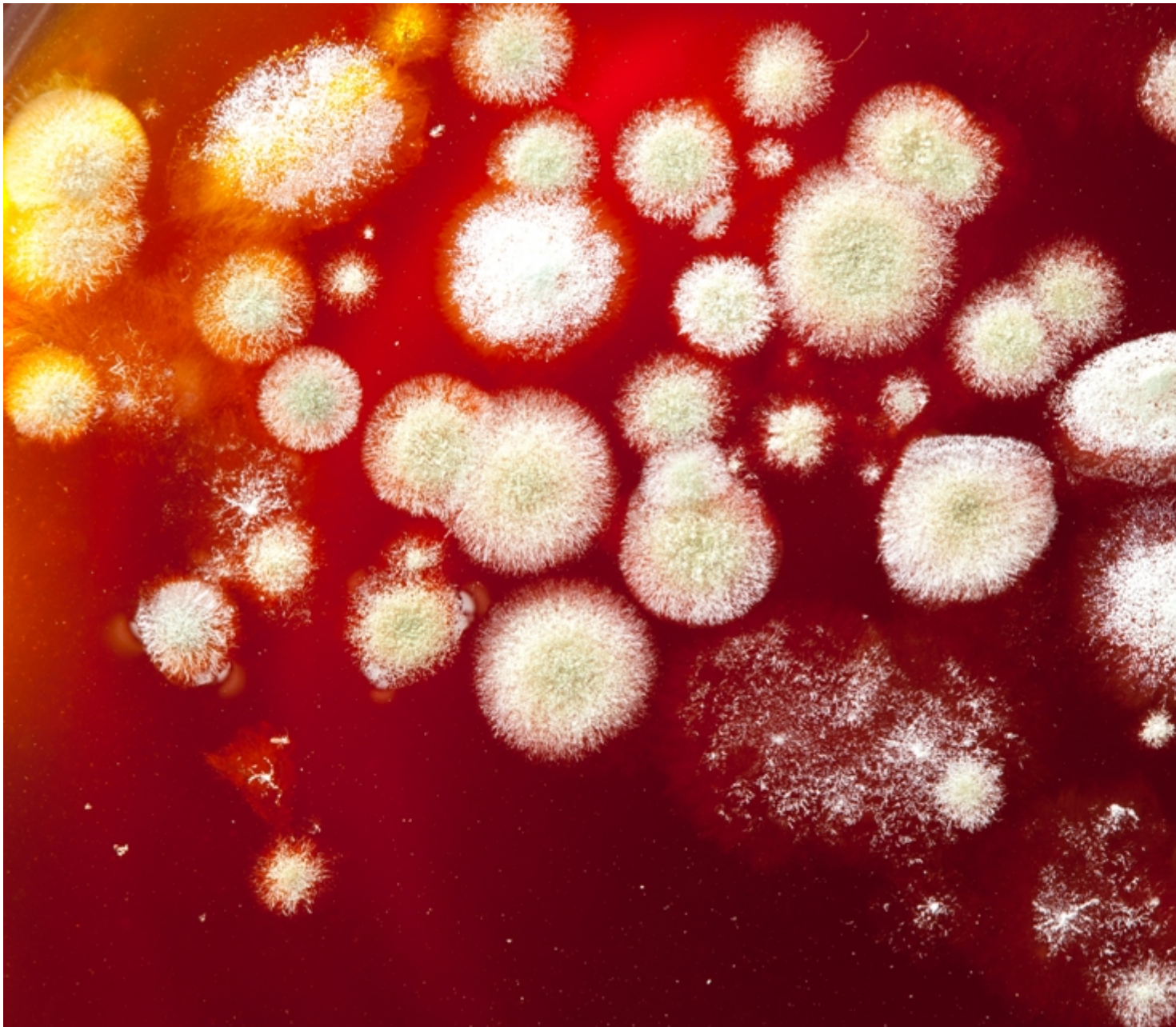


## Fungal Infections <sup>[1]</sup>

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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 surrounding 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 (HIV+).

## Candidiasis (includes yeast infections and thrush)

Candidiasis is a very common fungal infection usually caused by *Candida albicans*. This yeast-like fungus is found in all healthy people. The [immune system](#) [2] and bacteria normally found in the body generally keep *Candida* in check. When *Candida* is not kept in check, it can cause problems like vaginal yeast infections or thrush, which are described below.

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

The medications used to fight *Candida* are anti-fungal drugs called "azoles." Examples are Nizoral (ketoconazole), Diflucan (fluconazole), Sporanox (itraconazole), Vfend (voriconazole), or Noxafil (posaconazole). [Pregnant women](#) [3] should not take oral azoles (pills or liquids), because they may cause damage to the developing baby. Topical azoles used inside the vagina like Monistat (miconazole) or Gyne-Lotrimin (clotrimazole) creams, however, are safe for use during pregnancy. In addition, several of the anti-fungal drugs [interact](#) [4] with specific HIV drugs such as the protease inhibitor Norvir (ritonavir) and non-nucleoside reverse transcriptase inhibitors such as Sustiva (efavirenz), Viramune (nevirapine), Edurant (rilpivirine), and Intelence (etravirine) .

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

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

- May occur with normal [CD4 cell](#) [5] 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, 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 helpful bacteria in the vagina and is not recommended
- Alcohol and nicotine (present 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, and can also help reduce yeast growth.

### Treatment:

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

### Candidiasis of the Mouth (Thrush)

- Usually occurs with CD4 cell [5] count less than 300
- 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 and when steroid medications such as prednisone or certain asthma inhalants are being 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 the label to help you limit other forms of sugar, including corn syrup, fructose, and glucose.
- Eating yogurt or drinking kefir with active, live bacterial cultures like acidophilus can help prevent thrush. "Friendly" or "good" bacteria like acidophilus can help control the growth of *Candida*.

### Treatment:

- Local treatment with clotrimazole lozenges
- Oral anti-fungal medications that work throughout the body
- In most severe cases, amphotericin B is used, but it can have serious side effects [6]
- Alternative treatments:
  - Mouthwash containing gentian violet, which stains the mouth purple and can stain clothing
  - Mouthwash containing tea-tree oil
  - Saltwater rinse using 1/2 teaspoon salt to 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 [7]
- Major symptom is painful swallowing or feeling like food is sticking in your throat or chest
- Often diagnosed by history and clinical exam, can be confirmed by gastrointestinal

endoscopy (a lighted tube inserted through your mouth into your food pipe)

- Possible in anyone who has thrush and a low CD4 cell count, but can occur even when thrush cannot be seen in the mouth

### **Treatment:**

- Oral anti-fungal medications; fluconazole is most commonly used

## **Cryptococcal Meningitis**

The fungus *Cryptococcus neoformans* is very common. It is found in soil and bird droppings. While most people have been exposed to this fungus, they generally have immune systems that are healthy enough to prevent *Cryptococcus* from causing disease.

In people with weakened immune systems, especially HIV+ people with 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.

### **Symptoms:**

- Fever
- Headache
- Vision problems
- Confusion
- Nausea
- Vomiting

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

### **Diagnosis:**

- Spinal tap to gather and test a little sample of the fluid that surrounds the brain and spine
- Blood tests will usually show a high level of serum cryptococcal antigen

### **Treatment:**

- In most cases, a two-week regimen of intravenous amphotericin B and 5-flucytosine is used
- Afterwards, oral fluconazole is used daily to prevent recurrent disease
- Fluconazole can be stopped after at least one year of treatment, when the viral load has been undetectable and CD4 cell count has been 100 or more for 3 months or longer
- In milder cases of meningitis, 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.

In a healthy person, the infection is usually confined to the lungs, causing only mild symptoms. In HIV+ people with low CD4 cell counts (below 200), the infection can be life threatening. However, histoplasmosis is not a common disease in HIV+ people in the US.

### **Symptoms:**

- Fever
- Fatigue
- Shortness of breath
- Cough
- Weight loss

### **Diagnosis:**

- Finding the organism in a sample of blood, sputum, or other tissue

### **Treatment:**

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

## **Aspergillosis**

Aspergillosis is caused by *Aspergillus*, a very common group of fungi. In people with healthy immune systems, it usually causes mild or moderate 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 HIV+ people 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:**

- Sputum or nasal secretions that are tested for *Aspergillus*

### **Treatment:**

- Intravenous amphotericin B 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 or molds grow in soil found in the southwestern United States, in Mexico, and in Central and South America. You get infected by breathing fungal particles (spores) into your lungs, where the infection starts.

In people with healthy immune systems, coccidioidomycosis involves 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
- Backache
- Cough
- Fatigue
- Joint stiffness and pain
- Small, tender, raised, red bumps under the skin called erythema nodosum

### **Diagnosis:**

- Blood tests to look for signs of infection with *Coccidioides*
- Sputum sample tested for presence of *Coccidioides*

### **Treatment:**

- Intravenous (IV) amphotericin B
- In milder cases of coccidioidomycosis, oral fluconazole is sometimes used from the beginning

## **Conclusion**

Fungal infections can be common, and in some cases, very serious for HIV+ people. However, on-going medical care allows for the effective prevention or early diagnosis and treatment of these infections. In addition, most of the more serious fungal infections are more likely to occur in HIV+ people with low CD4 cells (especially less than 100). One way to prevent fungal infections from occurring is to keep the immune system healthy by using HIV drugs and seeing your health care provider on a regular basis.

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## Additional Resources

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

[Yeast Infections during Pregnancy \(BabyCenter\)](#) [33]

[HIV/AIDS and Fungal Infections \(CDC\)](#) [34]

[Fungal Infections in HIV/AIDS \(The Body\)](#) [35]

[HIV and Fungal Infections \(wellness.com\)](#) [36]

[Candidiasis \(AIDSmeds\)](#) [37]

[Oral Candidiasis and HIV Disease \(Project Inform\)](#) [38]

[HIV and Yeast Infections \(Positive Women's Network\)](#) [39]

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- [33] [http://www.babycenter.com/0\\_yeast-infections-during-pregnancy\\_485.bc](http://www.babycenter.com/0_yeast-infections-during-pregnancy_485.bc)
- [34] <http://www.cdc.gov/fungal/infections/hiv-aids.html>
- [35] <http://www.thebody.com/treat/candida.html>
- [36] <http://www.wellness.com/reference/allergies/hiv-and-fungal-infections/>
- [37] [http://www.aidsmeds.com/articles/Candidiasis\\_6842.shtml](http://www.aidsmeds.com/articles/Candidiasis_6842.shtml)
- [38] <http://www.projectinform.org/pdf/candidao.pdf>
- [39] <http://pwn.bc.ca/hiv-body/hiv-and-gynecological-care/hiv-and-yeast-infections/>
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