

# OPPORTUNISTIC INFECTIONS



information on nine of the most common infections that affect people living with hiv

This publication is intended as a general guide to managing opportunistic infections (OIs). Anyone dealing with one or more of these infections should consult their doctor.

A PUBLICATION FROM

PROJECT  
*inform*

Information,  
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Preventing and treating OIs is not an exact science. It often requires some complex trial-and-error to figure out the best regimen for a person. If standard drugs fail, it may be necessary to try different experimental drugs.

There's often a gap between the drugs prescribed by doctors with large HIV practices and those prescribed by doctors with less experience. At times, people may need to bring experimental drugs to the attention of their providers who haven't prescribed them before or do not know of their expanded access programs.

It can be challenging for some people to get the meds mentioned in this publication. Some are approved only for HIV; others are not approved for HIV but still may be prescribed for it. Most are available through clinical studies, expanded access or compassionate use programs.

However, not everyone has easy access to these programs or studies. Also, how people get prescriptions

may vary widely—like whether they're covered by private insurance or government programs. Working closely with your doctor or finding a skilled treatment advocate may help some people access these drugs.

As more drugs become available for managing OIs, there's the possibility of more drug interactions. Many drugs are broken down in the liver by a special enzyme. Drugs that use this enzyme can greatly alter the blood levels of other drugs.

Drugs broken down in the liver include clarithromycin, rifabutin, itraconazole, nevirapine, efavirenz, delavirdine, saquinavir, ritonavir, indinavir and nelfinavir. It is critical for people who take these drugs, especially those with chronic liver disease, to monitor side effects and efficacy. It's also important, if possible, to obtain specific drug levels in blood so that doses can be adjusted if necessary.



For a complete list of interactions with anti-HIV drugs, read Project Inform's publication, [Drug Interactions](#), available toll-free at 1-800-822-7422 or [www.projectinform.org](http://www.projectinform.org).

## Candidiasis (*thrush*)

*A fungal infection that can infect the whole body, often in the mouth and vagina.*

### Symptoms

White patches on gums, tongue or lining of mouth, pain, difficulty in swallowing and loss of appetite. Can also cause vaginal irritation, itching, burning and thick white discharge.

### Diagnosis

Usually by visual exam, smear or culture from biopsy.

### Preventive therapy (prophylaxis)

Not currently recommended because 1) current drugs effectively treat it; 2) resistant *Candida* may develop; and 3) drug interactions may occur. However, studies show that continuous fluconazole use lowers the risk of developing candidiasis. Pregnant women should not use preventive therapies, particularly azole drugs due to the risk of birth defects. Some diet changes may help decrease risk or recurrence.

### Treatment

Mild oral and vaginal candidiasis can be treated with topical therapy like nystatin and clotrimazole. Moderate oral, vaginal candidiasis and esophageal candidiasis should be treated with pill forms of therapy such as fluconazole, itraconazole or ketoconazole, which treat throughout the body (systemically).

**Alternatives:** IV amphotericin B or amphotericin B oral solution usually reserved for fluconazole-resistant *Candida*.

### Maintenance therapy

Not currently recommended for oral or vaginal candidiasis for same reasons as prophylaxis. If *Candida* recurs frequently and/or severely, then fluconazole or itraconazole should be considered. People with frequent recurrences of esophageal candidiasis should consider fluconazole (100–200mg a day). Pregnant women should avoid azole drugs due to risk of birth defects.

- For more information, read Project Inform's publications, *Oral Candidiasis*, *Systemic Candidiasis*, or *Vaginal Candidiasis*.

## Cryptococcal infection

*A fungus that primarily infects the brain.*

### Symptoms

Headaches, nausea, fever, fatigue, altered mental status and irritability. Can also cause seizures, coughing, sweats and difficulty in breathing.

### Diagnosis

Usually by spinal tap to test for antigen in cerebral spinal fluid.

### Preventive therapy (prophylaxis)

Not currently recommended because of the low incidence of the disease, lack of proven benefit, possible drug interactions and resistance to antifungal drugs. However, if a need for preventing other fungal infections exists, then people with CD4+ cell counts below 50 should consider fluconazole (100–200mg daily). Prevention with fluconazole or itraconazole should not be started by pregnant women because of the low incidence of the disease and possible birth defects. Also, women who become pregnant should stop using azole drugs.

### Treatment

Preferred: IV amphotericin B (0.7mg/kg daily) + flucytosine (25mg/kg 4 times a day) for 2 weeks then fluconazole (400mg daily) for 8 weeks. **Alternatives:** IV amphotericin B (0.7mg/kg daily) for 2 weeks then fluconazole (400mg daily) for 8 weeks. **Other alternatives:** Amphotericin B Colloidal Dispersion (ABCD); or Amphotericin B Lipid Complex (ABLC) may also be useful.

### Maintenance therapy

Everyone who has had cryptococcal disease should be on maintenance therapy for life. **Preferred:** Fluconazole (200mg daily).

Pregnant women should avoid azole drugs; amphotericin B is the preferred therapy.

### Stopping maintenance

Not currently recommended because of the few people studied.

- For more information, read Project Inform's publication, *Cryptococcal Meningitis*.

## Cryptosporidiosis

*A parasite that can cause diarrhea.*

### Symptoms

Chronic diarrhea with frequent watery stools, stomach cramps, nausea, fatigue, weight loss, appetite loss, vomiting, dehydration and electrolyte imbalance (especially sodium and potassium).

### Diagnosis

Detection of eggs (*oocysts*) in the stool or biopsy of small intestines.

### Preventive therapy (prophylaxis)

There are no proven effective therapies. People should try and avoid exposure to the organism, sometimes found in public water supplies.

### Treatment

No proven effective therapies, although people who respond to potent anti-HIV therapy, achieve undetectable viral loads and have rises in CD4+ cell counts have cleared the infection.

Initial treatment should be for re-hydrating (Gatorade, bouillon and/or oral re-hydration solution) and replacing electrolytes (fluids rich in electrolytes include vegetable juices, salty liquids like chicken broth, Gatorade and other sports drinks). Anti-motility (slows bowel movements) therapies like loperamide or tincture of opium may also provide temporary relief.

A regimen of paromomycin + azithromycin may be effective.

### Maintenance therapy

There are no proven therapies that prevent cryptosporidiosis.

► For more information, read the publication, *Cryptosporidiosis*, available from Project Inform.

## Cytomegalovirus (CMV)

*A virus that infects the entire body.*

### Symptoms (CMV-related)

**Retinitis (in eye, retina):** blurry vision or loss of central vision that can lead to blindness. **Colitis (colon):** fevers, diarrhea, stomach pain. **Esophagitis (throat):** ulcerations, pain and difficulty in swallowing. **Pneumonitis (lungs):** pneumonia-like symptoms. **Encephalitis (brain):** confusion, fever and tiredness.

### Diagnosis

**Retinitis:** eye doctor (ophthalmology) exam. **Esophagitis and colitis:** endoscopy and/or biopsy. **Pneumonitis:** diagnose for other organisms first such as bacteria, *Pneumocystis carinii*, etc. If negative, then bronchoscopy with bronchoalveolar lavage and/or biopsy. **Encephalitis:** Brain MRI (magnetic resonance imaging) and spinal tap.

### Preventive therapy (prophylaxis)

People whose CD4+ cell counts are consistently below 50 and who are CMV-positive are at highest risk for CMV disease and should consider oral ganciclovir (1g three times a day).

Pregnant women should not take oral ganciclovir because of possible birth defects. Also, women who become pregnant should stop using oral ganciclovir.

### Stopping preventive

It may be reasonable to consider stopping CMV preventive therapy for people with sustained CD4+ cell counts above 100–150 for 6 months or longer as a result of potent anti-HIV therapy.

### Treatment

**Retinitis preferred treatment:** Ganciclovir implants + oral ganciclovir (1,000mg three times a day); IV ganciclovir (5mg/kg every 12 hours for 14–21 days); IV foscarnet (90mg/kg every 12 hours for 14–21 days); or oral valganciclovir (900mg twice a day for 21 days then 900mg once a day for 7 days). **Alternatives:** IV cidofovir (5mg/kg once a week for 2 weeks) + probenecid or combination IV ganciclovir + IV foscarnet (as dosed above). **Esophagitis and colitis:** IV ganciclovir or IV foscarnet for 3–6 weeks. **Pneumonitis:** IV ganciclovir or IV foscarnet for 3–6 weeks. **Encephalitis:** IV ganciclovir, IV foscarnet or combination of both until clinical improvement.

### Maintenance therapy

Retinitis preferred treatment: IV ganciclovir (5mg/kg once a day); IV foscarnet (90–120mg/kg once a day); or ganciclovir implants + oral ganciclovir or oral valganciclovir (900mg once a day). **Alternatives:** IV cidofovir (5mg/kg once every 2 weeks) or IV ganciclovir + IV foscarnet (as dosed above). **Esophagitis and colitis:** Maintenance therapy is controversial although it might be considered if the initial symptoms were severe. **Pneumonitis:** Not recommended. **Encephalitis:** IV ganciclovir, IV foscarnet or combination of the two.

Pregnant women should take maintenance therapy, and the choice of therapy should be individualized.

### Stopping maintenance

It may be reasonable for people with sustained CD4+ cell counts above 100–150 (at least 3–6 months) and sustained suppression of viral load to consider stopping CMV retinitis maintenance therapy. Maintenance therapy should be restarted if CD4+ cell counts return to 50–100.

► For more information, read Project Inform's publication, *Cytomegalovirus*.

## Histoplasmosis

*A fungal infection.*

### Symptoms

Fever, fatigue, weight loss, difficulty breathing, swollen lymph nodes and pneumonia-like symptoms.

### Diagnosis

Test for Histoplasma antigen in urine and blood, bone marrow or blood culture or biopsy of lesion (skin, mouth or lymph node).

### Preventive therapy (prophylaxis)

People whose CD4+ cell counts stay consistently below 100 and who live in an area where Histoplasma is common or are at risk because of workplace exposure should consider itraconazole (200mg once a day).

Pregnant women should not take preventive therapy because of possible birth defects from using azole drugs.

### Treatment

**Preferred:** For people with severe disease, amphotericin B (0.7–1 mg/kg/day for 3–14 days) or the lipid formulations of amphotericin B (3mg/kg/day for 3–14 days). For mild disease, itraconazole (200mg three times a day for 3 days then 200mg twice a day for 12 weeks). **Alternative:** For mild disease, fluconazole (800mg once a day).

### Maintenance therapy

Everyone who has had histoplasmosis should be on maintenance. **Preferred:** Itraconazole (200mg twice a day). **Alternative:** IV amphotericin B (1mg/kg once a week).

For pregnant women, amphotericin B is preferred, especially during the first trimester.

### Stopping maintenance

Based on the small numbers of people in studies, stopping maintenance therapy is not currently recommended, although it may be reasonable for people with CD4+ cell counts above 200 and undetectable viral loads to consider stopping maintenance therapy.

- For more information, read the publication, *Histoplasmosis*, available from Project Inform.

## *Mycobacterium avium* complex (MAC)

*A bacterial infection found in water, dust, soil and bird droppings.*

### Symptoms

Persistent fever, night sweats, fatigue, weight loss, anemia, abdominal pain, dizziness, diarrhea and weakness.

### Diagnosis

Culture from a sterile site such as blood, bone marrow or cerebral spinal fluid.

### Preventive therapy (*prophylaxis*)

People whose CD4+ cell counts stay consistently below 50 should start preventive therapy. **Preferred:** Clarithromycin (500mg twice a day); or azithromycin (1,200mg once a week). **Alternative:** Rifabutin (300mg once a day).

### Stopping preventive

People with sustained CD4+ cells above 100 for 3–6 months and sustained viral load suppression may consider stopping preventive therapy.

### Treatment

**Preferred:** Azithromycin (500–600mg once a day); or clarithromycin (500mg twice a day) + ethambutol (15mg/kg/day) + rifabutin (300mg once a day).

**Alternative:** Azithromycin or clarithromycin + ethambutol + rifabutin +/- ciprofloxacin (500–750mg twice a day) +/- IV amikacin (10–15mg/kg/day).

IV amikacin can be added for severe disease.

Higher doses of clarithromycin (1,000mg twice a day) may be linked with increased risk of death. Clofazimine may be associated with increased side effects and risk of death and it should not be used.

### Maintenance therapy

Everyone who has had MAC should be on maintenance therapy with either clarithromycin (500mg twice a day) or azithromycin (500mg once a day) if it has been proven there is no resistance to either drug + ethambutol (15mg/kg once a day) +/- rifabutin (300mg once a day).

### Stopping maintenance

People with sustained CD4+ cells above 100 for 6–12 months as a result of potent anti-HIV therapy may consider stopping maintenance therapy.

- For more information, read Project Inform's publication, *Mycobacterium Avium Complex*.

## *Pneumocystis carinii* pneumonia (PCP)

*A parasite that infects the lungs; more correctly named for the fungus called Pneumocystis jiroveci.*

### Symptoms

Usually fever, cough and difficulty in breathing. Occasionally weight loss, night sweats and fatigue.

### Diagnosis

X-ray, induced sputum or bronchoscopy.

### Preventive therapy (prophylaxis)

Indicated when CD4+ cell counts equal or are below 200 (some say <250), when lowest ever (nadir) CD4+ cell count is below 200, and/or if history of candidiasis in the throat and/or unexplained persistent fever for over 2 weeks regardless of CD4+ cell counts.

**Preferred:** TMP/SMX (also called Bactrim or Septra; one single-strength tablet daily or one double-strength tablet daily or three times a week). A gradual increase in TMP/SMX dose may help reduce side effects. **Preferred alternative:** If unable to tolerate TMP/SMX, then

dapsone (100mg once a day); or dapsone (50mg once a day) + pyrimethamine (50mg once a week) + leucovorin (25mg once a week).

**Other alternatives:** Aerosol pentamidine (300mg once a month); atovaquone (1,500mg once a day); or IV pentamidine (300mg once a month).

### Stopping preventive

May be able to stop if CD4+ cell counts remain above 200 for more than 12 weeks from using potent anti-HIV therapy.

### Treatment

**Preferred:** TMP/SMX (2 double-strength tablets every 8 hours; or 5mg/kg TMP and 25mg/kg SMX intravenously every 8 hours. **Alternatives:** Trimethoprim (320mg every 8 hours) + dapsone (100mg once a day); atovaquone (750mg twice a day); clindamycin (300–450mg every 6 hours) + primaquine (15–30mg once a day); or IV

pentamidine (300mg once a day).

**Other alternative:** Trimetrexate (45mg/m<sup>2</sup> once a day intravenously) + leucovorin (20mg/m<sup>2</sup> every 6 hours) may also be useful.

Prednisone should be considered for people with acute illness (40mg every 12 hours for 5 days, then 40mg once a day for 5 days, then 20mg once a day for 11 days).

### Maintenance therapy

Everyone who has had PCP should be on maintenance therapy. The choice is the same as those for primary preventive therapy.

### Stopping maintenance

Although it may be possible to stop maintenance therapy if CD4+ cell counts stay above 200, there are insufficient data to make a current recommendation.

► For more information, read Project Inform's publications, *PCP Prevention* or *PCP Treatment*.

## Toxoplasmosis (*toxoplasma*)

*A parasite that primarily infects the brain.*

### Symptoms

Altered mental state (confusion, delusional behavior), severe headaches, fever, seizures and coma. Can also affect the eye causing eye pain and reduced vision.

### Diagnosis

MRI (magnetic resonance imaging) scan for brain lesions, antibody titer, tissue culture, CSF (cerebral spinal fluid) culture or sometimes presumptive (not using tests). If needed, brain biopsy to rule out lymphoma or PML.

### Preventive therapy (prophylaxis)

**If antibody positive:** Indicated when CD4+ cell counts are below 100 (some say 150).

**Preferred:** TMP/SMX (1 double-strength every 12 hours three times a week; or 1 single-strength or 1 double-strength tablet once a day). **Alternatives:** Pyrimethamine (50mg once a week) + dapsone (50mg once a week) + leucovorin (25mg once a week); or atovaquone (1,500mg once a day) + leucovorin (10mg once a day) with or without pyrimethamine (25mg once a day). **Other alternatives:** Pyrimethamine (50mg once a day); pyrimethamine (25mg three times a week) + sulfadoxine (500mg three times a week); dapsone (100mg twice a week); or roxithromycin (300mg every 8 hours once a week).

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## Toxoplasmosis, continued

Pregnant women may want to consider delaying prevention until after the first trimester.

### Stopping preventive

Stopping therapy is currently not recommended even with higher CD4+ cell counts from using anti-HIV therapy. However, newer data suggest that stopping therapy may be safe for people who maintain CD4+ cell counts above 200 for over 12 weeks.

### Treatment

**Preferred:** Pyrimethamine (200mg loading dose then 50–75mg once a day) + leucovorin (10–20mg once a day) + sulfadiazine (1g every 6 hours); or clindamycin (600mg every 6 hours).

**Alternative:** TMP/SMX (2.5–5mg/kg every six hours); or pyrimethamine (200mg loading dose then 50–75mg once a day) + leucovorin (10–20mg once a day) + one of the following: clarithromycin (1000mg every 12 hours), azithromycin (600–1,800mg once a day) or dapsone (100mg once a day). **Other alternatives:** Atovaquone (750mg every 6 hours); or trimetrexate (30–280 mg/m<sup>2</sup> once a day) + leucovorin (20mg/m<sup>2</sup> every 6 hours).

### Maintenance therapy

**Preferred:** Pyrimethamine (25–75mg once a day) + sulfadiazine (500–1,000mg four times a day) + leucovorin (10–25mg once a day). **Alternative:** Pyrimethamine (25–75mg once a day) + clindamycin (300–450mg every 6–8 hours) + leucovorin (10–25mg once a day); atovaquone (750 every 6–12 hours) + leucovorin (10mg once a day) with or without pyrimethamine (25mg once a day). **Other alternatives:** Pyrimethamine + sulfadoxine (25mg/500mg twice a week); pyrimethamine (50mg once a day); pyrimethamine (50mg once a day) + atovaquone (750mg every 6 hours); clarithromycin (1,000mg every 12 hours); dapsone (100mg twice a week); or azithromycin (600–1,800mg once a day).

### Stopping maintenance

Based on the small numbers of people studied, stopping maintenance therapy is not currently recommended.

- For more information, read the publication, *Toxoplasmosis*, available from Project Inform.

## Tuberculosis (TB)

*A bacterial infection that primarily infects the lungs.*

### Symptoms

Night sweats, cough, fever, shortness of breath and weight loss.

### Diagnosis

Tuberculin skin test, chest X-ray, CT (chromium topography) scan or acid-fast bacilli test.

### Preventive therapy (prophylaxis)

All HIV-positive people may be at increased risk for TB and should be tested for exposure, generally with a tuberculin skin test (TST). If TST is positive (red and very inflamed) but there's no active disease (symptoms), preventive therapy should be started. Pregnant women with no active disease may consider delaying preventive therapy until after the first trimester. If TST is positive and active disease is present, anti-TB treatment should be started.

**For people sensitive to isoniazid (INH), preferred treatment:** Isoniazid (300mg once a day) + pyridoxine (50mg once a day) for 9 months; isoniazid (900mg twice a week) + pyridoxine (100mg twice a week) for 9 months; or rifampin (600mg once a day) + pyrazinamide (20mg/kg once a day) for 2 months. **Alternatives:** Rifabutin (300mg once a day) + pyrazinamide (20mg/kg once a day) for 2 months; or rifampin (600mg once a day) for 4 months.

### For people resistant to isoniazid preferred treatment:

Rifampin (600mg once a day) + pyrazinamide (20mg/kg once a day) for 2 months. **Alternatives:** Rifabutin (300mg once a day) + pyrazinamide (20mg/kg once a day) for 2 months; rifampin (600mg once a day) for 4 months; or rifabutin (300mg once a day) for 4 months.

### For people resistant to INH and rifampin preferred

**treatment:** Ethambutol (15mg/kg once a day) + pyrazinamide (20mg/kg once a day) for 12 months; levofloxacin (500mg once a day) + ethambutol (15mg/kg once a day) for 12 months; or ciprofloxacin (750mg twice a day) + ethambutol (15mg/kg once a day) for 12 months.

### Treatment

**Preferred:** Isoniazid (300mg once a day) + rifampin (600mg once a day) + pyrazinamide (20–30mg/kg once a day) + pyridoxine (50mg once a day) +/- ethambutol (15–25mg/kg once a day) all for 2 months followed by isoniazid (300mg once a day) + rifampin (600mg once a day) + pyridoxine (50mg once a day) for 4 months. **Alternative:** Isoniazid (300mg once a day) + rifampin (600mg once a day) + pyridoxine (50mg once a day) +/- ethambutol (15–25mg/kg once a day).

### Maintenance therapy

Maintenance therapy is not required for people with full resolution of symptoms from anti-TB treatment.

- For more information, read Project Inform's publication, *Tuberculosis*.