

# *Mycobacterium avium* complex (MAC)

## Summary

*Mycobacterium avium* complex (MAC) is a life-threatening bacterial infection. The disease affects people with AIDS who have a severely suppressed immune system and are not taking anti-HIV drugs or medication to prevent MAC. However, thanks to effective anti-HIV drugs, MAC has become relatively rare.

People with HIV whose CD4 counts are below 50 are at risk of developing MAC. Symptoms include fever, weight loss, sweats/chills, diarrhea, cramping, fatigue, weakness and anemia (low red blood cell count). Antibiotics are used to prevent and treat the illness.

## What is MAC?

MAC is caused by two kinds of bacteria, usually a bacteria called *Mycobacterium avium*. This bacteria is common in the environment. It can be found in soil, food, dust and water, and probably enters the body by being breathed in or swallowed.

MAC is one of a number of infections that can develop in people who are living with HIV, called opportunistic infections. These only occur if your immune system is quite weakened and your body becomes vulnerable to infections that would not affect you if you were healthy. Almost everyone has the bacteria that cause MAC in their bodies; however, it is only in people who have very weakened immune systems that these bacteria develop into an infection.

MAC can affect just one part of the body, such as the lungs or the digestive system, or it can spread throughout the body.

## Who is at risk for MAC?

People who have a weakened immune system, due to HIV, cancer, long-term use of corticosteroid drugs, or an organ or bone marrow transplant, are at risk of developing MAC.

People with HIV most at risk of developing MAC are those who:

- have a CD4 count below 50
- have a viral load over 100,000 copies/ml
- have previously had MAC or another opportunistic infection

## Symptoms

The symptoms of MAC include

- fever
- weight loss
- sweats/chills
- diarrhea
- cramping
- abdominal pain
- weakness
- fatigue
- anemia (low red blood cell count)

These symptoms may be very mild at first. It can take several weeks, even months, before someone with MAC feels ill.

## Diagnosis

Because the symptoms of MAC are common to many infections, your doctor may order some tests before diagnosing the disease. These tests may check samples of your blood, tissue, body fluids or bone marrow, for the MAC bacteria. A bone marrow test is usually avoided because of its invasiveness.

MAC can be difficult to diagnose: the MAC bacteria cannot always be identified in people who have the disease.

## Treatment

Because MAC can be so serious and so difficult to diagnose, doctors often begin treatment as soon as they suspect a person may have MAC. Two or more antibiotic drugs are usually used because MAC bacteria can quickly become resistant to the effects of one drug alone.

The preferred first drug is called clarithromycin (sold as Biaxin). If you cannot tolerate this drug or it interacts with other medications you are taking, azithromycin (sold as Zithromax) may be used instead. Both of these medications also protect against other respiratory bacterial infections.

Ethambutol (Myambutol) is the recommended second drug. Some doctors prescribe a third, and even a fourth, drug. The third and fourth drugs might include rifabutin or other medications given by injection.

It is important to take these medications exactly as prescribed. If you miss a dose or stop and restart the medication, MAC can become resistant to the medication.

Side effects from clarithromycin and azithromycin may include nausea, vomiting, abdominal pain, an unpleasant taste, liver damage and hypersensitivity reactions. Your doctor may recommend ways of managing these side effects.

Symptoms usually improve within two to four weeks of starting treatment, although it may take longer for a person to feel better if they have more extensive disease or a severely suppressed immune system. If, after four to eight weeks of treatment, there is little or no improvement in symptoms, blood tests may be repeated. If MAC is still present in the blood, your doctor may prescribe a new combination of drugs.

If you are diagnosed with MAC and are not already taking anti-HIV drugs, it is recommended that you start, regardless of your CD4 count. This should strengthen your immune system and help you fight off the infection. Anti-HIV drugs should be started after the antibiotic treatment has been taken for two weeks, to reduce the risk of complications and drug interactions. If you are already taking anti-HIV drugs at the time of diagnosis, continue taking them unless drug interactions between the anti-HIV drugs and antibiotics make it unsafe to do so.

A portion of people develop IRIS (immune reconstitution inflammatory syndrome), which is characterized by a fever and worsening symptoms of the infection, shortly after starting anti-HIV drugs. For people who develop moderate to severe symptoms of IRIS when already taking anti-HIV drugs, doctors

will likely prescribe non-steroidal anti-inflammatory (also known as NSAIDs). If the symptoms of IRIS do not improve as a result, it is recommended that corticosteroid drugs be prescribed.

## Prevention

It is not possible to avoid being exposed to the bacteria that cause MAC. The best way to prevent developing the disease is to keep your immune system strong and your CD4 count well above 50. Taking anti-HIV drugs every day exactly as prescribed can help keep your CD4 count above 50.

A person with HIV whose CD4 counts is below 50 should also take preventive medication. The antibiotic drugs recommended for preventing MAC are:

- azithromycin (Zithromax); or
- clarithromycin (Biaxin).

The combination of clarithromycin and rifabutin should not be used as it is likely to cause side effects.

If neither azithromycin nor clarithromycin can be tolerated, rifabutin is an alternative; however, this medication interacts with many commonly used medications, including some anti-HIV drugs, birth control pills and antifungal medications.

The medication your doctor prescribes to prevent MAC should be taken until your CD4 counts rises and remains above 100 for at least three consecutive months. Do not stop taking your prescribed medications until you have talked to your doctor.

If, after stopping preventive medication, your CD4 count drops to below 50 again, talk to your doctor about resuming the preventive medication.

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## Credits

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Decisions about particular medical treatments should always be made in consultation with a qualified medical practitioner knowledgeable about HIV-related illness and the treatments in question.

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