Mycobacterium Avium Complex (MAC)

WHAT IS MYCOBACTERIUM AVIUM COMPLEX?

Mycobacterium Avium Complex (MAC) is a serious illness caused by common bacteria. MAC is also known as MAI (Mycobacterium Avium Intracellulare). MAC infection can be localized (limited to one part of the body) or disseminated (spread through the whole body, sometimes called DMAC). MAC infection often occurs in the lungs, intestines, bone marrow, liver, and spleen.

The bacteria that cause MAC are very common. They are found in water, soil, dust, and food. Almost everyone has them in their body. A healthy immune system will control MAC, but people with weakened immune systems can develop MAC disease.

Up to 50% of people with AIDS may develop MAC, especially if their CD4 cell count is below 50 cells/mm^3. MAC almost never causes disease in people with CD4 cell counts above 100 cells/mm^3.

HOW DO I KNOW IF I HAVE MAC?

The symptoms of MAC can include high fevers, chills, diarrhea, weight loss, stomach aches, fatigue, and anemia (low numbers of red blood cells). When MAC spreads in the body, it can cause blood infections, hepatitis, pneumonia, and other serious problems.

Many different opportunistic infections (OIs) can cause these symptoms. Therefore, your healthcare provider will probably check your blood, urine, or saliva to look for the bacteria that causes MAC. The sample will be tested to see what bacteria are growing in it. This process, called culturing, can take several weeks. Even if you are infected with MAC, it can be hard to find the MAC bacteria.

If your CD4 cell count is less than 50 cells/mm^3, your healthcare provider might treat you for MAC, even without a definite diagnosis. This is because MAC infection is very common but can be difficult to diagnose.

HOW IS MAC TREATED?

The MAC bacteria can mutate and develop resistance to some of the drugs used for treatment. Healthcare providers use a combination of antibacterial drugs (antibiotics) to treat MAC. At least two drugs are used: usually azithromycin (Zithromax) or clarithromycin (Biaxin) plus up to 3 other drugs. MAC treatment must continue for life or else the disease will return. Antiretroviral therapy and immune reconstitution and achieving a CD4 count >50 cells/mm3 will help to control MAC.

People react differently to anti-MAC drugs. You and your healthcare provider may have to try different combinations before you find one that works for you with the fewest side effects.

The most common MAC drugs and their side effects are:

- **Amikacin (Amkin):** side effects include kidney and ear problems; taken as an injection
- **Azithromycin (Zithromax):** side effects include nausea, headaches, vomiting, diarrhea; taken as capsules or intravenously (IV)
- **Ciprofloxacin (Cipro or Ciloxan):** side effects include nausea, vomiting, diarrhea; taken as tablets or IV
- **Clarithromycin (Biaxin):** side effects include nausea, headaches, vomiting, diarrhea; taken as capsules or IV (the maximum dose is 500 mg twice a day)
- **Ethambutol (Myambutol):** side effects include nausea, vomiting, vision problems
- **Rifabutin (Mycobutin):** side effects include rashes, nausea, anemia; many drug interactions
- **Rifampin (Rifampicin, Rifadin, Rimactane):** side effects include fever, chills, muscle or bone pain; can turn urine, sweat, and saliva red-orange (may stain contact lenses); can interfere with birth control pills; many drug interactions

CAN MAC BE PREVENTED?

The bacteria that cause MAC are very common. It is not possible to avoid being exposed. The best way to prevent MAC is to take strong antiretroviral medications (ARVs). Even if your CD4 cell count drops very low, there are drugs that can stop MAC disease from developing in up to 50% of people.

The antibiotic drugs azithromycin and clarithromycin have been used to prevent MAC. These drugs are usually prescribed for people with CD4 cell counts less than 50 cells/mm^3.

Combination antiretroviral therapy (ART) can make your CD4 cell count go up. If it goes over 100 cells/mm^3 and stays there for 3 months, it may be safe to stop taking medications to prevent MAC.

Be sure to talk with your healthcare provider before you stop taking any of your prescribed medications.

DRUG INTERACTION PROBLEMS

Several drugs used to treat MAC interact with many other drugs, including ARVs, antifungal drugs, and birth control pills. This is especially true for rifampin, rifabutin, and rifapentine. **Be sure your healthcare provider knows about all the medications, vitamins, and supplements that you are taking so that all possible interactions can be considered.**

THE BOTTOM LINE

MAC is a serious disease caused by common bacteria. MAC can cause serious weight loss, diarrhea, and other symptoms.

If you develop MAC, you will probably be treated with azithromycin or clarithromycin plus 1-3 other antibiotics. You will have to continue taking these drugs for life to avoid a recurrence of MAC.

People with CD4 cell counts less than 50 cells/mm^3 should talk with their healthcare providers about taking drugs to prevent MAC.

MORE INFORMATION

HIV.gov: Mycobacterium avium Complex Disease

UCSF HIV InSite: Mycobacterium avium Complex and Atypical Mycobacterial Infections in the Setting of HIV Infection

POZ: Mycobacterium Avium Complex (MAC)

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