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Pulmonary *Mycobacterium avium-intracellulare* Complex Infection in the Immunocompetent Host

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Pulmonary *Mycobacterium avium-intracellulare* Complex Infection in the Immunocompetent Host

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INTRODUCTION

Nontuberculous mycobacteria (NTM) were first described in the late 19th century following Koch's discovery of the tubercle bacillus in 1882. It was not until the 1950s, however, that NTM were recognized as important pathogens, when they were shown to cause disease in patients with established, severe chronic lung disease, such as bronchiectasis secondary to healed tuberculosis. Early on in the AIDS epidemic, *Mycobacterium avium* was shown to cause disseminated infections in severely immunocompromised hosts. Subsequently, the *Mycobacterium avium-intracellulare* complex (MAC) was implicated as a cause of lung disease in immunocompetent patients with no preexisting lung disease.¹ It is now recognized that the MAC organisms are not just colonizers but rather represent pathogens that must be treated in most patients. Despite increased awareness of MAC as a pathogen as well as recent advances in diagnostic techniques and treatment, the management of patients with MAC continues to be challenging for several reasons, including the long duration of treatment, poor sputum conversion rates, antibiotic resistance, and noncompliance with therapy. This manual reviews the diagnosis and treatment of MAC pulmonary disease in immunocompetent patients.

When first isolated, *M. avium* and *M. intracellulare* were classified together as *M. avium-intracellulare* complex because of difficulty in distinguishing between the 2 organisms. For most purposes, infections with these organisms are considered together, although there are subtle differences between them. In this manual, we use the term MAC to refer to the complex, which also includes *Mycobacterium X*, where X represents undesigned species of mycobacteria.

EPIDEMIOLOGY

NTM are ubiquitous in the environment. They have

been isolated from soil and water,^{2,3} which appear to be the reservoir for most infections, as well as from poultry, swine, birds, and reptiles. It was initially postulated that birds may act as a reservoir for infection, but studies suggest that animal-to-human transmission is not important. There is no evidence demonstrating that person-to-person transmission occurs.⁴ Pulmonary disease from MAC infection in immunocompetent hosts usually affects hosts with preexisting lung disease. The pathogenic nature of MAC organisms in immunocompetent patients without preexisting lung disease was demonstrated by Prince and colleagues in 1989.¹

In a landmark study, Palmer performed skin testing with 5 tuberculin units (TU) on more than 22,000 nursing students after taking a complete history of geographic residence.⁵ The presence of an induration larger than 5 mm was considered a positive result, and patients with negative results were retested with 250 TU. Analysis of the subjects with negative results on 5 TU testing showed a median reaction of 7 mm to the 250 TU dose in those who lived exclusively in the southeastern United States, with 65% having a reaction of at least 5 mm. There was a median reaction of 0 mm in subjects from other parts of the United States. The degree of tuberculosis exposure obtained by history was not related to the reaction to the 250 TU dose. The author proposed that these patients were infected with antigenically similar organisms.⁵ Subsequently, Gruft et al obtained water and air samples along the East Coast and found that the regional distribution of the highest number of MAC strains coincided with the areas of skin-test reactors as determined by earlier studies.⁶ The preponderance of MAC in the southeast probably is related to the warmer temperature in this region given that the organisms grow best above 17.8°C, but other unknown factors may play a role. Interestingly, disseminated MAC in AIDS, unlike pulmonary disease, does not seem to have a geographic preference in the United States.⁷

Because MAC infection is not a reportable disease in the United States, obtaining accurate information about