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*Review Article*

# CT Findings of Mycobacterium Avium Intracellulare Infections in the Lung

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***ABSTRACT***

*Mycobacterium avium intracellulare (MAI) is the most common pulmonary pathogen in the population with acquired immunodeficiency syndrome (AIDS). The most common radiological pattern was multiple pulmonary nodules. The commonly observed CT findings are centrilobular, peribronchovascular nodules, bronchiectasis, consolidation, tree-in-bud, pleural thickening, pleural adhesion.*

***Key words:*** *Mycobacterium avium intracellulare, computed tomography, lung*

***Akciğerde Mikobakteriyum avium intraselülare Enfeksiyonun BT Bulguları***

*ÖZET*

*Mikobakteriyum avium intraselülare (MAI), kazanılmış immun yetmezlik sendromu bulunan hastalarda (AIDS) en sık görülen pulmoner patojendir. Çok sayıda pulmoner nodüller en sık görülen radyolojik paternidir. BT en sık görülen bulgular sentrilobüler, peribronkovasküler nodüller, bronşektazi, konsolidasyon, tomurcuklanmış ağaç görünümü, plevral kalınlaşma ve plevral adezyondur.*

***Anahtar kelimeler:*** *Mikobakteriyum avium intraselülare, bilgisayarlı tomografi, akciğer*

## INTRODUCTION

Mycobacterium avium intracellulare (MAI) is the most common pulmonary pathogen among the nontuberculous mycobacteria. MAI is an acid-fast atypical mycobacterium. It has been emphasized that patients with predisposing immunodeficiency status, especially in the population with acquired immunodeficiency syndrome (AIDS) or chronic lung diseases (chronic obstructive pulmonary disease, prior tuberculosis, lung cancer) are the usual hosts of pulmonary MAI infection (1). However, there is an increasing recognition that pulmonary MAI predominantly occurs in older women without underlying malignancies or immune compromised states (2,3). The MAI is ubiquitous in the environment and has been isolated from water, soil and animals. Water is the likely source of human MAI infection. Recently, there has been a dramatic increase in the prevalence of MAI infections. This is thought to be owing to better clinical recognition and increased culturing for pulmonary disease (4).

The appearances of MAI lung disease on chest radiography were considered indistinguishable from those owing to Mycobacterium tuberculosis (5, 6). In 1989 Prince et al (3) were the first to recognize MAI infection in patients without pre-existing lung disease. The most common radiological pattern was multiple pulmonary nodules (3). In 1992 Reich et al (7) reported that MAI lung disease can present with a lingular and middle lobe pattern on chest radiography. Computed tomography (CT) studies of MAI lung disease have demonstrated nodular opacities and bronchiectasis with middle lobe and lingular bronchiectasis being suggestive of MAI lung disease (2,8,9).

### *Clinical Features*

MAI (also known as Mycobacterium avium complex) is the

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atypical mycobacterium most commonly associated with human disease. Symptoms include fever, swollen lymph nodes, diarrhea, fatigue, weight loss and shortness of breath (10-13). It is primarily a pulmonary pathogen that affects individuals with immune compromise secondary to AIDS, hairy cell leukemia, and immunosuppressive chemotherapy. In this clinical setting, MAI has been associated with osteomyelitis; tenosynovitis; synovitis; and disseminated disease involving the lymph nodes, the liver, the spleen, and the bone marrow. Although the prevalence of MAI has increased following the AIDS epidemic, it remains a care cause of skin disease (14-16). Cervical adenitis most commonly affects children. Cervical adenitis may cause local destruction of superficial structures and may result in cosmetic and functional impairment without treatment, but dissemination beyond the primary site is rare (17). Pulmonary MIA disease is diagnosed by (1) the isolation of MIA from two or more lower respiratory tract specimens or from a single lung biopsy sample, (2) an infiltrative revealed by chest radiography, and (3) the absence of other identified pulmonary pathogens or malignancies (18,19).

### *CT Features*

The chest radiography is often used as the first medical imaging investigation of patients with suspected lung disease. Radiographic patterns of pulmonary MIA disease is slowly progressive nodular opacities (3). In patients with pulmonary nodules the differential diagnosis includes neoplastic processes such as haematogenous metastases, lymphangitic carcinomatosis, bronchioalveolar carcinoma and lymphoma, sarcoidosis, silicosis and coal workers pneumoconiosis and fungal and mycobacterial infections (4). The chest radiography and CT findings in patients with AIDS and MAI infection are similar to those in patients with AIDS and tuberculosis. Hilar and/or mediastinal lymphadenopathy is commonly identified in patients with MAI (20, 21). CT adds considerable information in the diagnostic work-up of these patients. It is able to demonstrate the number and distribution of nodules, characterize the opacities as ill defined, centrilobular in distribution and are associated with bronchectiasis. In evaluating abnormalities on chest radiography by correlating findings with CT, it is assumed that CT scans are superior in most aspects to chest radiographs in demonstrating abnormalities in patients with MAI lung disease (4). CT scan discloses the presence of diffuse lung infiltrates even when corresponding chest radiographs are normal (22). Comparatively, CT added significantly in the assessment of bronchiectasis and cavities.

The commonly observed CT findings are centrilobular, peribronchovascular nodules, bronchiectasis, consolidation, tree-in-bud, pleural thickening, pleural adhesion. Spiculation, pleural indentation could be seen at the nodules (23, 24). Moore (25) examined CT scans of the chest from the patients with cultures positive for atypical mycobacteria. Common manifestations included bronchiectasis, air-space disease, nodules, and scarring and/or volume loss. Less commonly observed signs were cavities, lymphadenopathy, and pleural disease. Serial scans showed new areas of bronchiectasis and progression of existing bronchiectasis, suggesting that the bronchiectasis was not a preexisting condition but resulted from infection. The identification of multifocal coexistent bronchiectasis, air-space disease, and nodules at CT should raise the possibility of atypical mycobacterial lung disease, even in an otherwise healthy patient. The combination of multiple small nodules on CT with bronchiectasis, particularly in the middle lobe and/or lingual, should suggest the diagnosis (8,26,27).

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