Fatal Pulmonary Infection with Mycobacterium celatum in an Apparently Immunocompetent Patient

IRENE BUX-GEWEHR,1 HANS P. HAGEN,1 SABINE RÜSCH-GERDES,2 AND GERHARD E. FEURLE1*  
I. Medizinische Klinik, DRK-Krankenhaus Neuwied, 56564 Neuwied,1 and Forschungszentrum Borstel, 23845 Borstel,2 Germany

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Mycobacterium celatum is a recently described mycobacterium isolated from patients who have suppressed cell-mediated immunity, such as AIDS. We present here, to our knowledge, the first report of a fatal pulmonary infection caused by M. celatum in a 73-year-old immunocompetent female patient. The mycobacterium was identified by a 16S rRNA sequence analysis.

Mycobacterium celatum is a recently described nontuberculous mycobacterium (3, 18). These nontuberculous, or atypical, mycobacteria are found widely in nature. Only a few species are pathogenic in humans. The epidemiology of these organisms is not well understood, but person-to-person transmission has never been demonstrated. Most infections occur in patients with suppressed cell-mediated immunity, such as AIDS (6, 9, 13, 17). Immunocompetent patients are rarely infected. Single cases of pulmonary infection or lymphadenitis caused by Mycobacterium scrofulaceum, Mycobacterium avium complex, or Mycobacterium kansasi have been observed (1). One child with lymphadenitis caused by M. celatum has been reported (8). To our knowledge, a pulmonary infection by M. celatum is an immunocompetent patient has not been described.

Case report. A 73-year-old female Caucasian patient (163 cm, 61 kg) developed a nonproductive cough. Her medical and family histories were unremarkable, apart from diabetes mellitus type 2 diagnosed in 1985 and treated with glyburide (gli-benclamide) (HbA1, 10.5%). Physical examination revealed no pathological findings except moist rales in the upper left lung. A chest X-ray (Fig. 1) and the presence of acid-fast bacteria in the sputum indicated a mycobacterial pulmonary infection. As the strongly positive tine test suggested immunocompetence, the intracutaneous reaction to tuberculin indicated cellular immunity. This species was initially recognized by biochemical reactions similar to those of M. avium but sensitivity to ethambutol. These results were confirmed by a radiometric method (BACTEC 460TB).

Discussion. To our knowledge, this is the first report of a pulmonary infection by M. celatum in a patient with apparently normal cellular immunity. This species was initially recognized by biochemical reactions similar to those of M. avium but presented a mycolic acid pattern that was like that of Mycobacterium xenopi (4, 15). Also, the DNA probe used for culture confirmation may give misleading results, because the M. tuberculosis DNA probe shows cross-reactivity in cases of M. avium tuberculosis complex, which revealed resistance to isoniazid, rifampin, and pyrazinamide but sensitivity to ethambutol. These results were confirmed by a radiometric method (BACTEC 460TB).

Laboratory analysis revealed acid-fast bacteria in the gastric juice and the sputum. The erythrocyte sedimentation rate was 120/120 mm/h, hemoglobin was 131 g/liter, thrombocytes were 438/μl, and leukocytes were 8.1/μl (neutrophils, 83%; monocytes, 8%; eosinophils, 1%; lymphocytes, 8%). The lymphocyte subpopulations were T4, 36.5% (237/μl), and T8, 14.7% (95/μl); the T4/T8 ratio was 2.5. Analysis of the blood gases showed a pH of 7.53, a partial CO2 pressure of 5.25 kPa, a partial O2 pressure of 7.5 kPa, and oxygen saturation of 92%. The tine test was strongly positive. Serum protein electrophoresis and clotting tests, serum aminotransferase and electrolytes, and the creatinine clearance rate were within normal limits, and antibodies against human immunodeficiency virus types 1 and 2 were not present.

The organism was initially cultured from sputum with liquid medium (BACTEC; Becton Dickinson) over 3 weeks. Primary culture on solid medium (Löwenstein-Jensen) was unsuccessful. The acid-fast organism from the gastric juice was not cultured. The isolated mycobacterium grew at 31 to 45°C; it was Tween 80 hydrolysis negative, nitrate reductase negative, arylsulfatase negative, and nicotinic acid and pyrazinamidase positive. DNA probes (Accuprobe; Gen-Probe Inc., San Diego, Calif.) specific for M. tuberculosis complex were positive after 5 min but negative after 10 min of hybridization. The gene fragment of the 16S rRNA was sequenced as described previously (3) and identified as belonging to M. celatum. Susceptibility testing by the proportion method with Löwenstein-Jensen medium revealed resistance to isoniazid, rifampin, and pyrazinamide but sensitivity to ethambutol. These results were confirmed by a radiometric method (BACTEC 460TB).

M. celatum cannot be identified by biochemical characteristics. At present the most practical way to distinguish M. celatum from other mycobacteria seems to be a positive DNA hybridization signal for M. tuberculosis complex at 5 min but negative hybridization at 10 min with the Accuprobe test.

Our patient did not have AIDS, and the strongly positive intracutaneous reaction to tuberculin indicated cellular immunocompetence. The total T4 helper cell number was low due to...
lymphopenia. The T4/T8 ratio was in the normal range. Lymphocytopenia in the circulating blood is a characteristic feature of active tuberculosis (10, 12); it may be caused by local recruitment of CD4 T lymphocytes to the sites of infection, such as granulomas and pleural and ascitic exudates, where lymphocytes are abundant (11, 14). A normal peripheral lymphocyte count is rapidly restored when treatment is successful (12). In AIDS, in contrast, total CD4 T lymphocyte numbers are depleted due to human immunodeficiency virus-induced lymphocyte destruction and secondary to impaired lymphocyte production due to loss of the normal thymic-lymphoid architecture (7).

The patient’s mild diabetes mellitus is unlikely to have contributed much to her susceptibility to infection. This means that pulmonary infection with *M. celatum* occurred in an apparently immunocompetent host. The delay of 4 weeks until the correct diagnosis of a nontuberculous mycobacteriosis was made and treatment with antimicrobials to which the offending organism was resistant may have contributed to the fatal outcome.

This report of a pulmonary infection with *M. celatum* indicates that not only the known nontuberculous mycobacteria, *M. kansasii*, *M. avium*, and *M. scrofulaceum*, can cause infections in immunocompetent humans (1). An exact and rapid diagnosis with direct amplified tests, as described for *M. tuberculosis* (5), and advances in diagnostic technology may be crucial for successful treatment of a nontuberculous mycobacterial infection.

REFERENCES