Cutaneous *Mycobacterium shigaense* Infection in Immunocompetent Woman, China

To the Editor: *Mycobacterium shigaense* is a novel, slow-growing, scotochromogenic mycobacterium (*1*), initially reported in 2012 as an opportunistic pathogen isolated from skin biopsy samples from a patient with a history of Hodgkin disease and severe cellular immunodeficiency. We describe the identification of this species in a chronic cutaneous infection in an immunocompetent woman.

A 56-year-old woman was admitted to our inpatient department in August 2011 with reddish papules, nodules, plaques, and scars on her face and neck (Figure, panel A) that had developed over >1 year, starting in June 2010. Initially, a few small papules appeared on her face; the primary papules gradually enlarged, spreading to the neck and developing into nodules, plaque, partly purulent lesions, and sometimes fistulas associated with moderate pain and scarring. The patient reported no history of trauma or surgical procedure and could not recall any potential inducement of the lesions or previous receipt of immunosuppressant therapy.

On physical examination, the patient was thin, with normal vital signs. Results of routine laboratory tests were unremarkable. Cephalic and cervical radiographs and computed tomography scans revealed lymphadenectasis of the neck only; a purified protein derivative test showed an erythema ≈8 mm in diameter on the forearm. Results of testing for HIV and human T-lymphotropic virus 1 antibody detection tests were negative. Cell-mediated immunity levels were detected by flow cytometry of peripheral blood cells; cell counts for CD3+, CD4+, CD8+ T-cells, and T-cell receptors and for CD19+ B-cells were within reference ranges.

Skin samples were collected from the face and neck of the patient and subjected to histopathologic examination, smear testing, and culture. Histopathologic examination showed a hyperplastic epidermis and noncaseating granulomatous infiltrates of lymphocytes, histiocytes, and multinucleate giant cells in the dermis (Figure, panel B). Results of Ziehl-Neelsen staining of smears for acid-fast bacilli and periodic acid–Schiff staining for fungi were negative; fungal and other bacterial cultures were sterile. Samples streaked on Löwenstein-Jensen medium at 32°C and 37°C for 4 weeks formed smooth, creamy, yolk yellow colonies (Figure, panel C); however, such colonies did not grow at 25°C and 45°C. Ziehl-Neelsen staining of samples from the colonies revealed acid-fast bacilli (Figure, panel D). Infection with a mycobacterium was suspected on the basis of these results.

The isolated bacilli were subjected to PCR restriction fragment-length polymorphism analysis and sequencing of the mycobacterial *hsp65* gene to identify the bacteria and strain (http://app.chuv.ch/prasite/index.html) (*2*,*3*). However, a match for the restriction pattern or the sequence of the isolated organism and *Mycobacterium* spp. was not found. Therefore, complete DNA sequences of the 16S rRNA, *hsp65*, and *rpoB* genes and the 16S–23S rRNA internal transcribed spacer (ITS) region were determined by using primers and PCR protocols described previously (*4*–*7*). The sequences of 16S rRNA, *rpoB* and the 16S–23S rRNA ITS region were identical to those of the nontuberculous mycobacterium species *M. shigaense*; the *hsp65* gene showed 94% similarity (online Technical Appendix, wwwnc.cdc.gov/EID/article/19/5/12-1022-Techapp1.pdf).

Results of biochemical tests of the isolate were positive for *Mycobacterium* spp. by a 2-week culture on MacConkey agar and a heat catalase test but

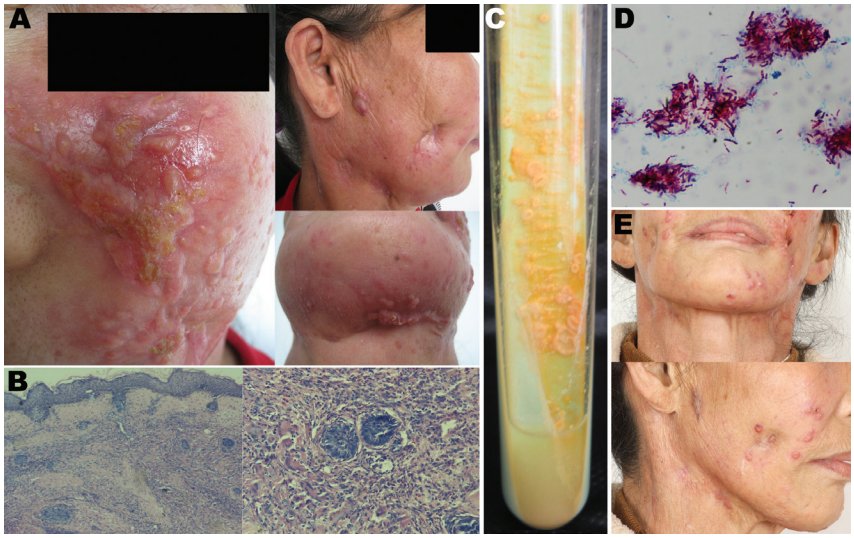

Figure. Cutaneous *Mycobacterium shigaense* infection in a 56-year-old Immunocompetent woman, China. A) Plaques, scars with scabbing, nodules, and concave scars on the face and neck and papules and scarring on the submaxilla. B) Histopathologic results, showing hyperplastic epidermis and infiltration with lymphocytes, neutrophilic leukocytes, multinuclear giant cells, and epithelioid cells in the dermis. C) Samples streaked on Löwenstein–Jensen medium at 32°C formed smooth, yolk yellow creamy colonies. D) Ziehl–Neelsen staining of bacilli from the colonies that tested positive. E) Visible improvement of lesions after 4 months of treatment.

weakly positive by 3-day arylsulfatase and 2-week catalase testing (*8*). Results of nitrate reduction, semiquantitative catalase, growth in 5% NaCl medium, urease, and Tween 80 hydrolysis testing were negative. In vitro drug susceptibility was investigated by using the microdilution method, according to Clinical and Laboratory Standards Institute guidelines (*9*). The isolate was susceptible to moxifloxacin, amikacin, clarithromycin, rifampin, ethambutol, streptomycin, and ofloxacin.

The patient was treated with orally administered rifampin (450 mg 1×/d), moxifloxacin (400 mg 1×/d), and clarithromycin (500 mg 2×/d) for 6 months. The lesions subsided, leaving hyperplastic and atrophic scars (Figure, panel E). New nodules did not recur, and no notable side effects were found.

In general, culture-based identification methods using biochemical tests are slow and inadequate in differentiating species of mycobacteria. Laboratory methods with better performance, such as genetic investigations using nucleic acid amplification and sequencing, are increasingly used for identification. In this case, the complete gene sequences of 16S rRNA, 16S–23S rRNA ITS region, *rpoB,* and *hsp65* of the isolate were used to find the most consistent and highest scoring match across all 4 loci in GenBank (www.ncbi.nlm.nih.gov/genbank).

In conclusion, our results strongly suggest that this chronic cutaneous infection in an immunocompetent patient was caused by *M. shigaense*. Our observations provide further evidence that this species should be classified as a nontuberculous mycobaterium that can cause disease in immunocompromised and immunocompetent patients. The isolate we identified was classified as clinically pathogenic and not an environmentally contaminating strain because it was isolated from multiple lesions and at different times. The lesions improved after treatment with clarithromycin and moxifloxacin, and the bacterium was not detectable thereafter.

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Technical Appendix

DNA sequences for *Mycobacterium shigaense* genes

All sequences are shown in a 5′→3′ orientation.

16S rRNA (*rrs*) (1,346 bp)

CGTGGGTAATCTGCCCTGCACTTCGGGATAAGCCTGGGAAACTGGGTCTAATACCGG
ATAGGACCACTTAGCGCATGCTTTGTGGTGGAAAGCTTTTGCGGTGTGGGATGGGCC
CGCGGCCTATCAGCTTGTTGGTGGGGTGACGGCCTACCAAGGCGACGACGGGTAGC
CGGCCTGAGAGGGTGTCCGGCCACACTGGGACTGAGATACGGCCCAGACTCCTACG
GGAGGCAGCAGTGGGGAATATTGCACAATGGGCGCAAGCCTGATGCAGCGACGCCG
CGTGGGGGATGACGGCCTTCGGGTTGTAAACCTCTTTCAGCAGGGACGAAGCGCAA
GTGACGGTACCTGCAGAAGAAGCACCGGCCAACTACGTGCCAGCAGCCGCGGTAAT
ACGTAGGGTGCGAGCGTTGTCCGGAATTACTGGGCGTAAAGAGCTCGTAGGTGGTTT
GTCGCGTTGTTCGTGAAAACCGGGGGCTTAACCCTCGGCGTGCGGGCGATACGGGC
AGACTGGAGTACTGCAGGGGAGACTGGAATTCCTGGTGTAGCGGTGGAATGCGCAG
ATATCAGGAGGAACACCGGTGGCGAAGGCGGGTCTCTGGGCAGTAACTGACGCTGA
GGAGCGAAAGCGTGGGGAGCGAACAGGATTAGATACCCTGGTAGTCCACGCCGTAA
ACGGTGGGTACTAGGTGTGGGTTTCCTTCCTTGGAATCCGTGCCGTAGCTAACGCAT
TAAGTACCCCGCCTGGGGAGTACGGCCGCAAGGCTAAAACTCAAAGGAATTGACGG
GGGCCCGCACAAGCGGCGGAGCATGTGGATTAATTCGATGCAACGCGAAGAACCTT
ACCTGGGTTTGACATGCACAGGACGCCGGCAGAGATGTCGGTTCCCTTGTGGCCTGT

GTGCAGGTGGTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTCCC
GCAACGAGCGCAACCCTTGTCTCATGTTGCCAGCGCGTAATGGCGGGGACTCGTGA
GAGACTGCCGGGGTCAACTCGGAGGAAGGTGGGGATGACGTCAAGTCATCATGCCC
CTTATGTCCAGGGCTTCACACATGCTACAATGGCCGGTACAAAGGGCTGCGATGCCG
CAAGGTTAAGCGAATCCTTTTAAAGCCGGTCTCAGTTCGGATCGGGGTCTGCAACTC
GACCCCGTGAAGTCGGAGTCGCTAGTAATCGCAGATCAGCAACGCTGCGGTGAATA
CGTTCCCGGGCCTTGTACACACCGCCCGTCACGTCATGAAAGTCGGTAACACCCGAA
GCCAGTGGCCTAACCTTTTGGAGGGAGCTGTCGAAGGTGGGATCGGCGA
GGAAAGGCCCCTTCGGGGGTACT

16S–23S rRNA internal transcribed spacer region (197 bp)

TCTCCAATTGGTGGGGTGTGAGCCGTGAGGGGTTCTCGTCTGTAGTGGACGAGGGCC
GGGTGCACAACAGCAGGCAAATCGCCAGACACACTATTGGGCCCTGAGGCAACACT
CAGTTCTTCCGAGTGCTGTCCCTCCATCTTGGTGGTGGGGTGTGGTGTTTGAGTATTG
GATAGTGGTTGCGAGCATCTAAATGA

***rpoB* (3,362 bp)**

GCACCTAACCGAGTTTCCTTTGCCAAGCTTCGCGAACCGCTTGAGGTTCCGGGGCTT
CTCGATGTGCAGACCGACTCGTTTGAGTGGCTGATCGGCTCGCCCCGCTGGCGCGAG
AGCGCGACCGCACGCGGCGAGGTCAGCCCGGTGGGTGGCCTCGAAGAGGTGCTCTA
CGAGCTGTCGCCGATCGAGGACTTCTCCGGCTCGATGTCGCTGTCGTTCTCCGACCC
GCGTTTCGACGAGGTCAAGGCGCCGGTCGACGAGTGCAAAGACAAGGACATGACGT
ACGCAGCCCCGCTGTTCGTCACGGCCGAGTTCATCAACAACAACACCGGCGAGATC
AAAAGCCAGACGGTGTTCATGGGCGACTTCCCGATGATGACCGAGAAGGGCACCTT
CATCATCAACGGGACCGAGCGCGTGGTCGTCAGCCAGCTGGTCCGGTCGCCCGGTG
TGTACTTCGACGAGTCCATCGACAAGTCGACCGAGAAACTGCTGCACAGCGTGAAG
GTGATCCCGAGCCGGGGCGCCTGGCTGGAGTTCGACGTCGACAAGCGCGACACCGT
CGGCGTGCGCATCGACCGCAAGCGCCGGCAGCCGGTCACCGTGCTGCTCAAGGCGC
TGGGCTGGACCAACGAGCAGATCACCGAGCGGTTCGGCTTCTCCGAGATCATGATCT

CGACGCTGGAGAAGGACAATACCGCCGGCACCGACGAGGCGTTGCTGGACATCTAC
CGCAAGCTGCGACCGGGCGAGCCGCCGACCAAGGAATCCGCGCAGACCCTGCTGGA
GAACCTGTTCTTCAAGGAGAAGCGCTACGACCTGGCCCGGGTGGGCCGCTACAAGG
TCAACAAGAAGCTCGGCCTGCACGCGGGCGAGCCGATCACCTCGTCGACGCTGACC
GAGGAAGACGTCGTCGCCACCATCGAGTACCTGGTGCGGCTGCACGAGGGCCAGGC
CACGATGACGGTGCCCGGCGGCTCCGAGGTTCCGGTGGAGACCGACGACATCGACC
ACTTCGGCAACCGCCGGTTGCGCACGGTCGGTGAGCTGATCCAGAACCAGATCCGG
GTCGGTATGTCCCGGATGGAGCGCGTGGTCCGGGAGCGGATGACCACCCAGGACGT
CGAGGCCATCACGCCGCAGACCCTGATCAACATCCGCCCGGTGGTCGCCGCGATCA
AGGAGTTCTTCGGCACGAGCCAGCTGTCGCAGTTCATGGACCAGAACAACCCGCTG
TCGGGTCTGACCCACAAGCGGCGTCTGTCGGCGCTGGGCCCGGGTGGTCTGTCCCGT
GAGCGCGCCGGCCTGGAGGTCCGCGACGTGCATCCGTCGCACTACGGCCGGATGTG
TCCGATCGAGACCCCGGAGGGTCCGAACATCGGTTTGATCGGTTCGCTGTCGGTGTA
CGCGCGGGTGAACCCGTTCGGGTTCATCGAGACGCCGTACCGCAAGGTGGTCGACG
GAGTCGTCACTGACGAGATCCACTACCTGACCGCCGACGAGGAGGACCGCCACGTC
GTGGCGCAGGCCAACTCGCCGATCGACGCGGCGGGCCGGTTCGAAGAGGTGCGTGT
CCTGGTCCGCCGGAAGGCGGGCGAGGTCGAGTACGTGGCATCGTCCGAGGTGGACT
ACATGGACGTGTCGCCGCGCCAGATGGTGTCGGTGGCCACGGCCATGATCCCGTTCC
TCGAGCACGACGACGCCAACCGTGCCCTGATGGGTGCGAACATGCAGCGCCAGGCG
GTTCCGCTGGTGCGCAGCGAGGCGCCGCTGGTCGGCACCGGGATGGAGCTGCGCGC
CGCGATCGACGCCGGCGACGTCGTCGTCGCCGACAAGGCCGGGGTGATCGAGGAGG
TCTCCGCCGACTACATCACCGTGATGGCCGACGACGGCAGCCGGCACACCTACCGG
ATGCGCAAGTTCGCGCGGTCCAACCACGGCACCTGCGCCAACCAGTCGCCGATCGT
GGACGCCGGCGAACGCGTCGAAGCCGGCCAGGTGATTGCCGACGGCCCGTGCACCG
AAAACGGTGAGATGGCGCTGGGCAAGAACCTGCTGGTCGCGGTCATGCCGTGGGAG
GGGCACAACTACGAGGACGCGATCATCCTGTCCAACCGCCTGGTTGAAGAGGACGT
GCTCACCTCGATCCACATCGAGGAGCACGAAATCGACGCCCGCGACACCAAGCTGG

GCGCCGAGGAGATCACGCGGGACATCCCGAACGTCTCCGACGAGGTGCTCGCCGAC
CTGGACGAGCGCGGCATCGTGCGTATCGGTGCCGAGGTCCGCGACGGCGACATCCT
GGTCGGCAAGGTCACCCCGAAGGGTGAGACCGAGCTGACACCGGAGGAGCGGCTG
CTGCGCGCGATCTTCGGTGAAAAGGCCCGCGAGGTCCGCGACACGTCGCTGAAGGT
GCCGCACGGTGAGTCCGGCAAGGTGATCGGTATCCGGGTGTTCTCCCGCGAAGACG
ACGACGAACTGCCCGCCGGCGTCAACGAGCTGGTCCGGGTCTACGTCGCCCAGAAG
CGCAAGATCTCCGATGGCGACAAGCTGGCCGGACGGCACGGCAACAAGGGCGTCAT
CGGCAAGATCCTGCCGGTGGAGGACATGCCCTTCATGCCGGACGGCACTCCGGTCG
ACATCATCCTGAACACCCACGGTGTGCCGCGACGGATGAACATCGGTCAGATCCTG
GAGACGCACCTGGGGTGGGTCGCCAAGGCCGGCTGGAACATCGAGGGCACGCCCGA
CTGGGCGGCGAATCTGCCGGAGGACCTGCGCCACGCTGCGCCGGACCAGACGGTGT
CGACCCCGGTGTTCGACGGCGCCAAGGAGGAGGAGCTGCAGGGCCTGTTGTCCTGC
ACACTGCCTAACCGCGACGGCGACGTGATGGTCAACGCCGACGGCAAGGCGCAGCT
CTTCGATGGCCGCAGCGGGGAGCCGTTCCCGTACCCGGTGACCGTTGGCTACATGTA
CATCATGAAGCTGCACCACCTGGTGGACGACAAGATCCACGCCCGTTCCACCGGCC
CGTACTCGATGATCACCCAGCAGCCGTTGGGTGGTAAGGCGCAGTTCGGTGGCCAG
CGGTTCGGCGAGATGGAGTGCTGGGCCATGCAGGCCTACGGCGCCGCGTACACGCT
GCAGGAACTACTGACCATCAAGTCCGACGACACCGTCGGCCGGGTCAAGGTGTACG
AGGCGATCGTCAAGGGCGAGAACATCCCAGAGCCGGGGATTCCCGAGTCGTTCAAG
GTGTTGCTCAAGGAGCTGCAGTCGCTGTGCCTCAACGTCGAGGTGCTGTCGAGCGAC
GGTGCGGCGATCGAGCTGCGCGAGGGYGAGGACGAAGACCTCGAGCGCGC

hsp65 **(1,526 bp)**

GCTCATGCCCTTGCCGACGCGGTAAAGGTGACGTTGGGGCCCAAGGGTCGCAACGT
CGTCCTGGAGAAGAAGTGGGGCGCTCCCACGATCACCAACGATGGTGTGTCCATCG
CCAAGGAGATCGAGCTGGAGGACCCCTACGAGAAGATCGGCGCCGAGCTGGTCAAG
GAAGTCGCCAAGAAGACCGACGACGTTGCCGGTGACGGCACGACGACGGCCACCGT
GCTCGCTCAGGCACTCGTCAAAGAGGGCCTGCGCAACGTGGCGGCCGGCGCCAACC

CGTTGGCCCTCAAGCGCGGCATCGAGAAGGCTGTCGAGAGCGTCACCGAGACGCTG
CTCAAGTCGGCCAAGGACGTCGAGACCAAGGAGCAGATCGCGGCCACCGCGGGTAT
CTCCGCGGGCGACCAGTCGATCGGCGATCTGATCGCCGAGGCCTTGGACAAGGTCG
GCAACGAGGGCGTCATCACTGTCGAGGAGTCCAACACCTTCGGCCTGCAGCTCGAG
CTCACCGAGGGCATGCGGTTCGACAAGGGCTACATCTCGGGCTACTTCGTCACCGAC
CCCGAGCGTCAGGAAGCGGTCCTCGAGGACCCCTACATCCTGCTGGTCAGCTCCAA
GGTGTCGACCGTCAAGGATCTGCTGCCCCTGCTGGAGAAGGTCATCCAGTCCGGCA
AGCCGCTGCTGATCATCGCCGAGGACGTCGAGGGCGAGGCGCTGAGCACCCTGGTC
GTCAACAAGATCCGCGGCACGTTCAAGTCGGTGGCGGTCAAGGCCCCCGGTTTCGG
TGACCGTCGCAAGGCGATCTTGCAGGACATCGCCATCCTGACCGGCGGCCAGGTGA
TCAGCGAAGAGGTCGGCCTGTCGTTGGAGAACACGGACCTTTCGCTGCTGGGCAAG
GCCCGCAAGGTCGTGATCACCAAGGACGAGACCACCGTCGTCGAGGGCGCCGGTGA
CACCGACGCCATCGCCGGCCGGGTGGCCCAGATCCGCGCCGAGATCGAGAACAGCG
ACTCCGACTACGACCGCGAGAAGCTGCAGGAGCGTCTGGCCAAACTGGCCGGCGGT
GTTGCGGTGATCAAGGCCGGCGCCGCCACCGAGGTGGAGCTCAAGGAGCGCAAGCA
CCGCATCGAGGACGCGGTGCGCAACGCCAAGGCCGCCGTCGAGGAGGGCATCGTCG
CCGGTGGTGGCGTGGCCCTGCTGCAGGCGGCCCCGTCGCTGGACAAGCTGAAGCTG
TCGGGTGACGAGGCGACCGGCGCCAACATCGTCCGCGTGGCGCTGTCGGCTCCGCT
GAAGCAGATCGCCTTCAACTCCGGGCTGGAGCCCGGCGTGGTCGCCGAGAAGGTCC
AGAACTCGCCCGCGGGTACCGGTCTGAACGCCGCCACCAACGAGTACGAGGACCTG
CTCAAGGCCGGCGTTGCCGACCCGGTCAAGGTGACCCGTTCGGCGCTGCAGAACGC
GGCGTCCATTGCGGGCCTGTTCCTGACGACCGAGGCCGTCGTTGCCGACAAGCCGG
AGAAGGCCGCCGC