LETTERS

New Clinical Strain of 
Neisseria gonorrhoeae with Decreased Susceptibility to Ceftriaxone, Japan

Takashi Deguchi,1 Mitsuru Yasuda,1 Kyoko Hatazaki,1 Koji Kameyama, Kengo Horie, Taku Kato, Kohsuke Mizutani, Kensaku Seike, Tomohiro Tsuchiya, Shigeaki Yokoi, Masahiro Nakano, Mutsumasa Yoh

Author affiliations: Gifu University, Gifu, Japan (T. Deguchi, M. Yasuda, K. Hatazaki, K. Kameyama, K. Horie, T. Kato, K. Mizutani, K. Seike, T. Tsuchiya, S. Yokoi, M. Nakano); Yoh Clinic, Inazawa, Japan (M. Yoh)

Address for correspondence: Joseph R. Hoyt, University of California, Santa Cruz–Ecology and Evolutionary Biology, 1156 High St, Santa Cruz, CA 95064, USA; email: hoyjosephr@gmail.com; and Jiang Feng, Northeast Normal University, Changchun-School of Environment, 5268 Renmin St., Changchun, Jilin, People’s Republic of China; email: fengj@nenu.edu.cn

DOI: http://dx.doi.org/10.3201/eid2201.150868

To the Editor: In 2009, 2010, and 2013, Neisseria gonorrhoeae strains H041 (ceftriaxone MIC of 2 mg/L), F89 (ceftriaxone MIC of 1 mg/L), and A8806 (ceftriaxone MIC of 0.5 mg/L) were isolated from samples from patients in Japan (1), France (2) and Australia (3), respectively. In Japan, no other clinical N. gonorrhoeae strains with decreased susceptibility to ceftriaxone were reported until 2014, when clinical strain GU140106 (ceftriaxone MIC of 0.5 mg/L) was isolated from a man in in Nagoya, Japan. We report details of this case and sequencing results of the penA gene for the strain. The study was approved by the Institutional Review Board of the Graduate School of Medicine, Gifu University, Japan.

N. gonorrhoeae strain GU140106 was isolated from a urethral swab sample from a man with acute urethritis. The man had received fellatio, without condom use, from a female sex worker in Nagoya in December 2013. He visited our clinic in January 2014 for urethral discharge. Culture of a urethral swab sample was positive for N. gonorrhoeae. We used the Cobas 4800 CT/NG Test (Roche Molecular Systems Inc., Pleasanton, CA, USA) to test a first-voided urine sample; results were positive for N. gonorrhoeae but negative for Chlamydia trachomatis. The infection was treated with a single-dose regimen of ceftriaxone (1 g) administered by intravenous drip infusion. Two weeks later,

1These authors contributed equally to this article.
NG-MAST assigned strain GU140106 to sequence type 7363, the same as strains H041 and A8806. MLST assigned strain GU140106 to a previously reported (8, 9) strain, including 250-mg and 500-mg doses of ceftriaxone. However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

The penA gene of strain GU140106 was sequenced as previously described (6); results showed the presence of a novel mosaic penicillin-binding protein 2 (PBP2; GenBank accession no. LC056026) (Figure). Multilocus sequence typing (MLST) and N. gonorrhoeae multiantigen sequence typing (NG-MAST) of GU140106 were performed as previously reported (8, 9). MLST assigned strain GU140106 to sequence type 7363, the same as strains H041 and A8806 (1, 2). NG-MAST assigned strain GU140106 to sequence type 6543. MLST and NG-MAST results for GU140106 differed from those for F89 (3).

Since the naming of the mosaic PBP2 associated with decreased susceptibilities to oral cephalosporins as pattern X (6), various PBP2 mosaic structures have been discovered. Mosaic PBP2 structures are basically composed of fragments analogous to PBP2s in Neisseria species. Before strain H041 emerged, strains harboring mosaic PBP2s had been resistant to oral cephalosporins but susceptible to ceftriaxone. H041 (ceftriaxone MIC of 2 mg/L) had additional novel amino acid changes, including A311V, V316P, and T483S, in its mosaic PBP2. The presence of substitutions A311V, V316P, and T483S was reported to be responsible for resistance to ceftriaxone (7). Like strain H041, strains GU140106 and A8806 (ceftriaxone MICs of 0.5 mg/L) had substitutions A311V and T483S, but instead of substitution V316P, they had substitution V316T. In addition, GU140106 had several changes in positions 227–281 that were not present in other strains. These alterations might also contribute to the decreased susceptibility to ceftriaxone.

On the basis of pharmacodynamic analyses (10), a 1-g dose of ceftriaxone (the recommended first-line treatment for gonorrhea in Japan) would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.

This N. gonorrhoeae strain, GU140106, was isolated from the urethra of a man who received fellatio from a female sex worker who had just performed fellatio without condom use from a male who received fellatio. The test-of-cure for gonorrhea in Japan would be effective against genital gonorrhea caused by strains exhibiting decreased susceptibility to ceftriaxone (e.g., strains GU140106 and A8806). However, such strains could be resistant to lower-dose regimens, including 250-mg and 500-mg doses of ceftriaxone.
female sex worker; thus, the bacteria could have derived from her pharynx. *N. gonorrhoeae* strain H041 was previously isolated from the pharynx of a female sex worker (J). To prevent the emergence and spread of ceftriaxone-resistant *N. gonorrhoeae*, pharyngeal gonorrhea must be treated. It is uncertain whether a 1-g dose of ceftriaxone would be effective against pharyngeal gonorrhea caused by strains with decreased susceptibility to ceftriaxone, and this regimen might facilitate the selection of such strains from oral cefepim-resistant strains in the pharynx. The emergence of *N. gonorrhoeae* GU140106 in Japan suggests that new strategies (not just increased ceftriaxone doses), including combination treatment with ceftriaxone and another class of antimicrobial drugs and multiple dose regimens of ceftriaxone, might be required to treat pharyngeal gonorrhea.

This study was supported in part by the Japan Society for the Promotion of Science (Grant-in-Aid for Scientific Research [C] 25462509 and [C] 2646244201).

References


Address for correspondence: Takashi Deguchi, Department of Urology, Graduate School of Medicine, Gifu University, Gifu 501-1194, Japan; email: deguchi@gifu-u.ac.jp

Measles Outbreak among Adults, Northeastern China, 2014

Ming-Xiang Zhang,1 Jing-Wen Ai,1 You Li, Bing-Yan Zhang, Wen-Hong Zhang

Author affiliations: The Sixth People’s Hospital of Shenyang, Shenyang, China (M.-X. Zhang, Y. Li); Fudan University, Shanghai, China (J.-W. Ai, B.-Y. Zhang, W.-H. Zhang)

DOI: http://dx.doi.org/10.3201/eid2201.151293

To the Editor: In 2005, the World Health Organization (WHO) proposed to eliminate measles in the Western Pacific Region by 2012, and in 2006, China began a 6-year measles elimination campaign. The strategy included a routine 2-dose measles-containing vaccine (MCV) for children 8 months and 18–23 months of age, supplemented by nationwide vaccination activities in 2010 for children born during 1996–2010 (J). As a result, China’s measles incidence rate has dropped sharply since 2008 and reached its lowest level (0.46 cases/100,000 population) in 2012 (2). However, the rate has risen again since 2012; in 2014, incidence was 3.88 cases/100,000 population (3). Shenyang, a hub city in northeastern China, experienced a massive measles outbreak in 2014, and we analyzed the causes and characteristics of this outbreak.

Shenyang Center of Disease Control reported 2,058 confirmed measles cases (1,447 laboratory diagnosed, 611 clinically diagnosed) in 2014 (25.02 cases/100,000 population), much higher than that reported in Shenyang in 2013 (2.33/100,000). Most cases occurred in children 0–1 years of age (487 cases; 1.145.77/100,000), followed by persons 25–30 (227 cases; 28.57/100,000), 30–35 (203 cases; 28.57/100,000), and 35–40 (203 cases; 35.02/100,000) years of age. Among all 2,058 confirmed cases, 438 patients were hospitalized because of measles complications; no deaths were reported.

1 These authors contributed equally to this article.