Eurosurveillance
Free of charge for authors, free of charge for readers.

Back to Table of Contents

Next

Eurosurveillance, Volume 12, Issue 46, 15 November 2007

Articles

Citation style for this article: Zaiss NH, Weile J, Ackermann G, Kuijper EJ, Witte W, Nuebel U. A case of Clostridium difficile-associated disease due to the highly virulent clone of Clostridium difficile PCR ribotype 027, March 2007 in Germany. Euro Surveill. 2007;12(46):pii=3306. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3306

A case of *Clostridium difficile*-associated disease due to the highly virulent clone of *Clostridium difficile* PCR ribotype 027, March 2007 in Germany

NH Zaiß[1], J Weile[2], G Ackermann[3], E Kuijper[4], W Witte (WitteW@rki.de)[1], U Nübel[1]

1. Robert Koch Institute, Wernigerode, Germany
2. Robert-Bosch-Krankenhaus, Institut für Klinische Chemie und Laboratoriumsmedizin, Stuttgart, Germany
3. Institute for Laboratory Medicine, University Hospital Leipzig, Leipzig, Germany
4. Reference Laboratory for *Clostridium difficile*, Leids Universitair Medisch Centrum, Leiden, the Netherlands

Increasing rates of *Clostridium difficile*-associated disease (CDAD) have been reported from North America since 2003. This increase is associated with the emergence and spread of a particular strain of *C. difficile* characterised as PCR ribotype 027 or pulsotype NAP1. This epidemic strain produces toxins A and B and the binary toxin, is resistant to erythromycin and the newer fluoroquinolones, and patients infected with it are more likely to experience severe disease [1]. More recently, the epidemic PCR ribotype 027 strain has spread to Europe. Epidemics of *C. difficile*-associated disease (CDAD) due to this new, highly virulent strain have been detected in England and Wales, Ireland, the Netherlands, Belgium, Luxembourg and France, and isolates exhibiting PCR ribotype 027 (no data on virulence-associated traits available) have been detected in Austria, Scotland, Switzerland, Poland, Denmark and Finland [2-7].

In Germany, a dramatic, nationwide increase of CDAD incidence was observed between 2000 and 2004 [8,9]. However, an association between this increase and the occurrence of the epidemic PCR ribotype 027 strain has not been documented. Here, we report the isolation of *C. difficile* PCR ribotype 027 from a patient suffering from pseudomembranous colitis in Germany in March 2007. The strain was identified during a retrospective PCR ribotyping survey of stored isolates.

Case report

In early January 2007, a 76-year-old man was admitted to a hospital in Stuttgart, in southern Germany, for treatment of an elbow fracture. Postoperatively, the patient developed a wound infection requiring several revisions. Following isolation of *Staphylococcus aureus* from a wound swab culture, the patient was treated with amoxicillin/clavulanic acid, then later with cefalexin. When a second wound swab yielded *Enterobacter cloacae* and an *Escherichia coli*-strain-producing extended-spectrum beta-lactamase, treatment was changed to imipenem/cilastatin.

In late March 2007, the patient developed pneumonia and severe pseudomembranous colitis. *Clostridium difficile* toxins A and B were detected in a stool specimen by enzyme immuno-assay. Three days later, the patient died from multi-organ failure and septic shock.

Characteristics of bacterial isolate

Stool culture performed in March 2007 yielded *C. difficile*. Retrospectively, the isolate was further characterised as PCR ribotype 027 at the reference laboratory in Leiden in August 2007. It exhibited a heretofore undescribed MLVA genotype, and, hence, a connection with strains circulating in the Netherlands [10] or the United States [11,12] could not be established. The genome of the isolate contained genes for toxin A, toxin B, and binary toxin. The *tcdC* gene is characterised by an 18-bp deletion and a single nucleotide deletion at position 117, which causes severe truncation of the encoded putative negative regulator of toxin A and B production. This *tcdC* genotype is typical of the epidemic, highly virulent PCR ribotype 027 clone, first isolated in North America [11].

Using E-tests, the isolate was determined as resistant to erythromycin, imipenem and moxifloxacin, and susceptible to metronidazole, vancomycin, clindamycin and doxycyclin. This resistance pattern has previously been reported for the epidemic PCR ribotype 027 strain. In contrast, 'historic' PCR ribotype 027 strains isolated prior to 2001 in Europe and North America were susceptible to moxifloxacin [1,13].

Conclusions

The highly virulent, epidemic strain of *C. difficile* PCR ribotype 027 was isolated from a patient suffering from severe, antibiotic-associated CDAD in a hospital in southern Germany. There was no indication of an outbreak situation. This report indicates that this strain was already present in Germany in March 2007.

This new strain may add to the increase of CDAD incidence that is already occurring in Germany. As a consequence, general practitioners' and public health institutions' awareness of the incidence and severity of CDAD should be enhanced. Hygienic guidelines must be followed to curb transmission of *C. difficile*, especially within hospitals and nursing homes. In case of outbreaks and severe disease courses, bacterial isolates should be obtained from toxin-positive faecal samples to enable resistance determination and investigations about possible clonal spread.

References:

1. McDonald LC, Killgore GE, Thompson A, Owens RC Jr, Kazakova SV, Sambol SP, et al. An epidemic, toxin gene-variant strain of Clostridium difficile. N Engl J Med. 2005;353:2433-2441.
2. Indra A, Huhulescu S, Hasenberger P, Schmid D, Alfery C, Wuerzner R, Fille M, Gattringer K, Kuijper E, Allerberger F. First isolation of Clostridium difficile PCR ribotype 027 in Austria. Euro Surveill. 2006;11(9):E060914.3. Available from: http://www.eurosurveillance.org/ew/2006/060914.asp#3
3. Joseph R, Demeyer D, Vanrenterghem D, van den Berg R, Kuijper EJ, Delmée M. First isolation of Clostridium difficile PCR ribotype 027, toxinotype III in Belgium. Euro Surveill. 2005;10(10):E051020.4. Available from: http://www.eurosurveillance.org/ew/2005/051020.asp#4
4. Kuijper EJ, Coignard B, Brazier J, Suetens C, Drudy D, Wiuff C, et al. Update of Clostridium difficile-associated disease due to PCR ribotype 027 in Europe. Euro Surveill. 2007;12(6)[Epub ahead of print]. Available online: http://www.eurosurveillance.org/em/v12n06/1206-221.asp
5. Kuijper EJ, van den Berg RJ, Debast S, Visser CE, Veenendaal D, Troelstra A, et al. Clostridium difficile ribotype 027, toxinotype III, the Netherlands. Emerg Infect Dis. 2006;12:827-30. Available from: http://www.cdc.gov/ncidod/eid/vol12no05/05-1350.htm
6. Lyytikäinen O, Mentula S, Kononen E, Kotila S, Tarkka E, Anttila V, Mattila E, Kanerva M, Vaara M, Valtonen V. First isolation of Clostridium difficile PCR ribotype 027 in Finland. Euro Surveill. 2007;12(11):E071108.2. Available from: http://www.eurosurveillance.org/ew/2007/071108.asp#2
7. Tachon M, Cattoen C, Blanckaert K, Poujol I, Carbonne A, Barbut F, Petit J, Coignard B. First cluster of C. difficile toxinotype III, PCR-ribotype 027 associated disease in France: preliminary report. Euro Surveill. 2006;11(5):E060504.1. Available from: http://www.eurosurveillance.org/ew/2006/060504.asp#1
8. 8. Reichardt C, Chaberny IF, Kola A, Mattner F, Vonberg RP, Gastmeier P. [Dramatic increase of Clostridium difficile-associated diarrhea in Germany: has the new strain PCR-ribotype 027 already reached us?]. Dtsch Med Wochenschr. 2007;132:223-8.
9. Vonberg RP, Schwab F, Gastmeier P. Clostridium difficile in discharged inpatients, Germany. Emerg Infect Dis. 2007;13:179-80. Available from: http://www.cdc.gov/ncidod/eid/13/1/179.htm
10. van den Berg RJ, Schaap I, Templeton KE, Klaassen CH, Kuijper EJ. Typing and subtyping of Clostridium difficile isolates by using multiple-locus variable-number tandem-repeat analysis. J Clin Microbiol. 2007;45:1024-8.
11. Curry SR, Marsh JW, Muto CA, O'Leary MM, Pasculle AW, Harrison LH. tcdC genotypes associated with severe TcdC truncation in an epidemic clone and other strains of Clostridium difficile. J Clin Microbiol. 2007; 45:215-21.
12. Marsh JW, O'Leary MM, Shutt KA, Pasculle AW, Johnson S, Gerding DN, et al. Multilocus variable-number tandem-repeat analysis for investigation of Clostridium difficile transmission in Hospitals. J Clin Microbiol. 2006;44:2558-66.
13. Kuijper EJ, Coignard B, Tull P. Emergence of Clostridium difficile-associated disease in North America and Europe. Clin Microbiol Infect. 2006;12 Suppl 6:2-18.

back to top

Back to Table of Contents

Next

To top | Recommend this page