REPORT

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First documented case of a *Staphylococcus lugdunensis* strain carrying the mecA gene in Northern Europe

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Staphylococcus lugdunensis is a clinically common wound pathogen belonging to coagulase-negative staphylococci. We herein report the first case of a *S. lugdunensis* isolate carrying the *mecA* gene in Northern Europe.

Keywords: *Staphylococcus lugdunensis*; *mecA*; *Northern Europe*

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Staphylococcus lugdunensis is a Gram-positive bacterium that was first described in 1988 by Freney et al. (1). It belongs to the coagulase-negative staphylococci (CoNS), but it is clinically more similar to *Staphylococcus aureus* due to its virulence and pathogenesis (2, 3). It is a common colonizer of the human skin (4), and it is the only pathogen in approximately 10% of skin and soft tissue infections (5). Apart from these infections, it is reported to cause endocarditis with high mortality (3), osteomyelitis, peritonitis, infections associated with foreign bodies (6), and urinary tract infections. With proper identification methods, the incidence is 53/100,000 infections per year (2).

The first case of a methicillin-resistant *S. lugdunensis* carrying the *mecA* gene was documented in 2003 (7). Since then, only four additional cases have been reported on three different continents (6, 8–10). Here, we describe the first reported case of *mecA*-carrying *S. lugdunensis* in Northern Europe.

Case report

A 93-year-old man visited his general practitioner for a wound on his left calf that had not healed after 1.5 months of observation. He had not received any antibiotic treatment recently, and his contacts with health care were limited. When inspected, four grouped skin lesions were noticed on the left calf. They ranged from 5 to 15 mm in diameter, and the largest had a suppurative ulcer with a central necrosis. The largest wound was cultured, and punch biopsies were taken. The patho-anatomical diagnosis (PAD) showed basal cell carcinoma, and the cultures yielded growth of *S. lugdunensis* and group G streptococci. The basaliomas were removed surgically, and the wounds healed thereafter without any antibiotic treatment.

Bacterial findings

The wound sample was inoculated onto blood and chocolate agar (Becton, Dickinson, and Company, Sparks, MD, USA). The plates were incubated overnight at 37°C, and *S. lugdunensis* and group G streptococci were identified with conventional methods. Antibiotic susceptibility to isoxazolylpenicillin, cefoxitin, fusidic acid, clindamycin, erythromycin, and trimethoprim-sulfamethoxazole was determined for the *S. lugdunensis* strain by disk diffusion test, according to the recommendations of the Swedish Reference Group for Antibiotics (www.srga.org). The strain was resistant to cefoxitin (inhibition zone 20 mm) and isoxazolylpenicillin (inhibition zone 9 mm). It was susceptible to all other antibiotics tested.

The *mecA* gene was detected with PCR (11), and the identity of the species was confirmed with 16S rDNA sequencing (12).

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Discussion

Staphylococcus lugdunensis is not a rare finding in clinical samples, but it is often identified as a CoNS and not to the species level in clinical microbiology laboratories (2). Its pathogenic potential is thereby missed that may lead to an unnecessary treatment delay.

Staphylococcus lugdunensis is not only a clinically relevant pathogen with an ability to form biofilms, but it has also become a possible carrier of the *mecA* gene in recent years. Overall, this gene appears to be on the move. It has disseminated through multiple acquisitions by different clones of otherwise usually beta-lactam susceptible species, such as *Staphylococcus saprophyticus,* during the last decade (13, 14). The methicillin resistance may go unrecognized, as there are sometimes discrepancies between oxacillin and cefoxitin susceptibility among CoNS (15). In this case, there was resistance to both antibiotics, but the inhibition zone around the cefoxitin disc was much larger and could have been overlooked if the zone had not been measured. In addition, the resistance to beta-lactams in *S. lugdunensis* can be mediated by changes in other penicillin-binding proteins (PBPs) (16).

Patients with diabetes mellitus and implants appear to be at increased risk for infections with *S. lugdunensis* (2, 6). Hitherto, no report has indicated that this bacterium is associated with basal cell carcinoma, but it seems reasonable to assume that the patient's skin lesions increased the risk of infection with typical wound pathogens. Since the patient had not been treated with antibiotics or been admitted to any hospital recently, the strain was probably community acquired. However, it is worrying that it was found in a country with a relatively low selective pressure and with an isolation frequency of methicillin-resistant *S. aureus* below 5% (17).

Although *S. lugdunensis* strains harboring the *mecA* gene have been rare clinical findings, so far, staphylococcal clones with this type of resistance have become more frequent. An acceleration of this development would mean a loss of beta-lactams as first-line drugs for treatment of more severe skin and soft tissue infections in the future. With rapid and correct identification of methicillin-resistant CoNS with a higher pathogenic ability, such as *S. lugdunensis*, the awareness may increase among physicians resulting in adequate treatments and early infection control measures.

Conflict of interest and funding

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References

1. Freney J, Brun Y, Bes M, Meugnier H, Grimont F, Grimont PAD, et al. *Staphylococcus lugdunensis* sp. nov. and *Staphylococcus* schleiferi sp. nov., two species from human clinical specimens. Int J Syst Bacteriol 1988; 38: 168–72.
2. Böcher S, Tønning B, Skov RL, Prag J. *Staphylococcus lugdunensis*, a common cause of skin and soft tissue infections in the community. J Clin Microbiol 2009; 47: 946–50.
3. Liu PY, Huang YF, Tang CW, Chen YY, Hsieh KS, Ger LP, et al. *Staphylococcus lugdunensis* infective endocarditis: a literature review and analysis of risk factors. J Microbiol Immunol Infect 2010; 43: 478–84.
4. Bieber L, Kahlmeter G. *Staphylococcus lugdunensis* in several niches of the normal skin flora. Clin Microbiol Infect 2010; 16: 385–8.
5. Sjölund M, Kahlmeter G. *Staphylococci* in primary skin and soft tissue infections in a Swedish county. Scand J Infect Dis 2008; 40: 894–8.
6. Shah NB, Osmon DR, Fadel H, Patel R, Kohner PC, Steckelberg JM, et al. Laboratory and clinical characteristics of *Staphylococcus lugdunensis* prosthetic joint infections. J Clin Microbiol 2010; 48: 1600–3.
7. Tee WS, Soh SY, Lin R, Loo LH. *Staphylococcus lugdunensis* carrying the *mecA* gene causes catheter-associated bloodstream infection in premature neonate. J Clin Microbiol 2003; 41: 519–20.
8. Kleiner E, Monk AB, Archer GL, Forbes BA. Clinical significance of *Staphylococcus lugdunensis* isolated from routine cultures. Clin Infect Dis 2010; 51: 801–3.
9. Spanu T, Rigante D, Tamburrini G, Fiori B, D'Inzeo T, Posteraro B, et al. Ventriculitis due to *Staphylococcus lugdunensis*: two case reports. J Med Case Reports 2008; 2: 267.
10. Tan TY, Ng SY, He J. Microbiological characteristics, presumptive identification, and antibiotic susceptibilities of *Staphylococcus lugdunensis*. J Clin Microbiol 2008; 46: 2393–5.
11. Salisbury SM, Sabatini LM, Spiegel CA. Identification of methicillin-resistant staphylococci by multiplex polymerase chain reaction assay. Am J Clin Pathol 1997; 107: 368–73.
12. Edwards U, Rogall T, Blocker H, Emde M, Böttger EC. Isolation and direct complete nucleotide determination of entire genes. Characterization of a gene coding for 16S ribosomal RNA. Nucleic Acids Res 1989; 17: 7843–53.
13. Higashide M, Kuroda M, Omura CT, Kumano M, Ohkawa S, Ichimura S, et al. Methicillin-resistant *Staphylococcus saprophyticus* isolates carrying staphylococcal cassette chromosome mec have emerged in urogenital tract infections. Antimicrob Agents Chemother 2008; 52: 2061–8.
14. Söderquist B, Berglund C. Methicillin-resistant *Staphylococcus saprophyticus* in Sweden carries various types of staphylococcal cassette chromosome mec (SCCmec). Clin Microbiol Infect 2009; 15: 1176–8.
15. Hung KH, Yan JJ, Lu YC, Chen HM, Wu JJ. Evaluation of discrepancies between oxacillin and cefoxitin susceptibility in coagulase-negative staphylococci. Eur J Clin Microbiol Infect Dis 2011; 30: 785–8.

16. Kotsakis SD, Tzouvelekis LS, Zerva L, Liakopoulos A, Petinaki E. *Staphylococcus lugdunensis* strain with a modified PBP1A/1B expressing resistance to β-lactams. Eur J Clin Microbiol Infect Dis 2011 (Epub ahead of print).
17. European Antimicrobial Resistance Surveillance System. Annual epidemiological report on communicable diseases in Europe – 2010. Available from: www.ecdc.europa.eu/en/publications/Publications/Forms/ECDC_DispForm.aspx?ID=578 [cited 1 June 2011].

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