Suspected Goat-to-Human Transmission of Methicillin-Resistant
*Staphylococcus aureus* Sequence Type 398

Igor Loncaric,a René Brunthaler,b Joachim Spergsera

Institute for Bacteriology, Mycology, and Hygienea and Institute of Pathology and Forensic Veterinary Medicine,b Department of Pathobiology, University of Veterinary Medicine, Vienna, Austria

Transmission of methicillin-resistant *Staphylococcus aureus* (MRSA) between animals and humans is widely recognized. In this study, we describe the first case of infection of a goat and suspected transmission of MRSA ST398 to a human, which resulted in colonization of animal owners by MRSA sequence type 398.

CASE REPORT

A goat 1 month and 17 days old (mixed breed) was submitted for necropsy because of the sudden deaths of three goats in a week from the same stable box, as reported by the animal owners. After a thorough gross examination, pathohistological and bacteriological examinations were performed. In the foreground were the changes in the lungs. The lungs showed high-grade alveolar edema and moderate alveolar emphysema and, in some places, far-reaching atelectasis. Histologically, the lungs showed a focal, low-moderate desquamative pneumonia with focal purulent components and subtle fibrin in the alveoli. At one location, several cocoid bacteria presented in the alveoli. Bacteriological examination yielded *Mycoplasma mycoides* subsp. *capri* and *Staphylococcus aureus* (isolate 414_12). *S. aureus* species identification was confirmed by PCR (1). Antimicrobial susceptibility testing by the disk diffusion method according to guidelines of the Clinical and Laboratory Standards Institute (2, 3) showed that this isolate was resistant to oxacillin, cefoxitin, penicillin, amoxicillin-clavulanic acid, ceftiofur, cefovecin, tetracycline, doxycycline, and enrofloxacin and susceptible to marbofloxacin, ciprofloxacin, ceftiofur, cefovecin, cefquinome, tetracycline, doxycycline, and mupirocin. The production of 

Received 19 November 2012 Returned for modification 14 December 2012 Accepted 16 February 2013 Published ahead of print 27 February 2013

Address correspondence to Igor Loncaric, igor.loncaric@vetmeduni.ac.at.

Copyright © 2013, American Society for Microbiology. All Rights Reserved.
doi:10.1128/JCM.03052-12
received any antibiotic therapy nor showed any clinical signs. As reported by the owner, none of the examined persons had been exposed to pigs and veal calves, which is a well-documented risk factor associated with acquisition of MRSA ST398 (11). Based on the data presented in the current case, we believe that the owner most likely became a carrier of MRSA ST398 after acquisition of MRSA by the goat, because the human isolate was indistinguishable from eight out of nine goat isolates by the methods used.

MRSA is a frequent pathogen of humans and many animal species. In the past years, the transfer of MRSA isolates between animals and humans gained specific attention, especially in the case of livestock-associated MRSA ST398 belonging to clonal complex 398 (CC398), which has been the most commonly reported MRSA strain found in association with livestock (12). However, there is still a scarcity of information on infections with MRSA ST398 in goats. Colonization of humans with ST398 in contact with infected colonized animals has been widely documented (12). Consequential infection of humans have also been reported (13), and in some areas with high livestock density, the prevalence is rising (14). Two Austrian regions, upper Austria and southeastern Styria, with intensive pig farming account for practically all human MRSA ST398 infections (15, 16). Although pig farming is as common as in upper Austria, there are no reports of MRSA ST398 in lower Austria. We recognize that the results of our study have limitations, because it was not possible to completely determine the source of MRSA. Despite this limitation, this study is the first to report MRSA ST398 in Austrian goats and, to our knowledge, the first to suggest transmission from goats to human.

In conclusion, our study contributes to the growing evidence that MRSA ST398 could be transmitted from animal to human. At this point, it could be highly recommended that unnecessary close contact with positive animals should be avoided.

ACKNOWLEDGMENT
There are no financial declarations or conflicts of interest to disclose.

REFERENCES