in Australia (5). Given the aforementioned linguistic and coordination issues with follow-up of migrant workers and the potential gravity of inappropriate clinical follow-up, it may be prudent to consider Q fever vaccination for all employees who work within UK meat-processing industries.

Public health practitioners should be aware of the continuously evolving multinational makeup of the local population and this should stimulate constant review of local translation services because census data seriously underrecognize the ethnic minority migrant worker population. Furthermore, many migrant workers are unsure of their rights to access primary and hospital care and the structure of healthcare is unfamiliar to many. GPs should consider zoonotic infections, such as Q fever, when patients with acute febrile illness report occupations, such as Q fever to endocarditis: serological follow-up strategy. Clin Infect Dis. 2006;42:e50–2.

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References


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**Fatal Streptococcus equi subsp. ruminatorum Infection in a Man**

To the Editor: *Streptococcus equi* belongs to the pyogenic group of streptococci and to group C of the Lancefield classification. It consists of 3 subspecies of zoonotic agents rarely reported as human pathogens (1,2): *S. equi* subsp. *equi*, *S. equi* subsp. *zooepidemicus*, and *S. equi* subsp. *ruminatorum*. We report here a case of human infection caused by *S. equi* subsp. *ruminatorum*. (3).

A 53-year-old man was admitted to an intensive care unit of our hospital (University Teaching Hospital, Montpellier, France) on April 28, 2006, with a high fever and in a comatose state. The day before, he had experienced headache and neck pain. He had been infected with HIV for 9 years but had not had an opportunistic infection. His ongoing HIV treatment consisted of ritonavir, lopinavir, abacavir, lamivudine, and co-trimoxazole; 3 weeks before admission, his body CD4+ T-cell count was 133/μL, and viral load was 118,000 copies/mL. At the time of admission, his body temperature was 38.9°C, heart rate was 105 beats/min, and blood pressure was 55/35 mmHg. He exhibited a fixed pupil in 1 eye, neck stiffness, and was nonresponsive. He had bilateral pulmonary infiltrates and severe hypoxemia. Treatment consisted of mechanical ventilation, fluid therapy, and norepinephrine. Laboratory investigations found the following: leukocyte count 9,600/mm³ with 90% neutrophils, hemoglobin level 9.0 g/dL, platelet count 32,000/mm³, C-reactive protein value 159 mg/L, and blood lactate concentration 3.2 mmol/L. Computed tomographic scanning of the brain showed no hemorrhage or edema. Lumbar puncture produced turbid cerebrospinal fluid (CSF) with 300 leukocytes/mm³ (95% neutrophils), protein 5.6 g/L, glucose <0.1 mmol/L, and gram-positive cocci. Three sets of aerobic-anaerobic blood cultures and bronchial aspirates were sampled, and intravenous treatment with dexamethasone (10 mg/6 h/day), cefotaxime (2 g/4 h/day), and vancomycin (30 mg/kg/day) was initiated. On day 2, the hemodynamic state was stabilized, but brain death occurred.

All sets of aero-anaerobic blood cultures, CSF, and bronchial aspirate fluid yielded the growth of a catalase-negative, β-hemolytic, gram-positive coccoid belonging to the Lancefield group C of streptococci. Antimicrobial susceptibility testing showed a bacterium fully susceptible to antibiotics tested. MICs of penicillin, amoxicillin, and cefotaxime were 0.047, 0.125, and 0.125 mg/L, respectively. The isolates were identified as *S. equi* by using the Vitek2 system, rapid ID32 STREP, and API 20 STREP strips (bioMérieux, Marcy l’Étoile, France), but phenotype was inconclusive for subspecies identification. The strains were identified as *S. equi* subsp.
zooepidemicus by Vitek2, but aesculin was not hydrolyzed, and D-ribose fermentation was noted, as previously described for S. equi subsp. ruminatorum. 16S rRNA gene–based identification was performed as previously described (4) on strain ADV 6048.06 from blood. The 1,396-bp sequence (GenBank accession no. EF362949) was compared with databases by using the BLAST program (5); the sequence differed by only 1 nucleotide position (>99.9% identity) from the sequence of S. equi subsp. ruminatorum CECT 5772T. Other similarly related sequences were from S. equi subsp. ruminatorum strains of animal origin (99.5%–99.9% identity) and from S. equi subsp. zooepidemicus, (98.7% identity). Phylogenetic trees clustered the clinical isolate with S. equi subsp. ruminatorum strains to form a robust lineage, well separated from other strains of S. equi and supported by a high bootstrap value (Figure).

S. equi subsp. equi and S. equi subsp. zooepidemicus are zoonotic agents implicated in diverse animal infections such as strangles, mastitis, abscesses, wounds, and respiratory and uterine infections. Human infections caused by S. equi subsp. equi, and S. equi subsp. zooepidemicus included outbreaks of foodborne diseases (6,7), meningitis, septicemia, arthritis, pneumonia, glomerulonephritis, and streptococcal toxic shock syndrome, in both immunocompromised and immunocompetent patients (1,2,8,9). S. equi subsp. ruminatorum was described in 2004 in domestic sheep and goats with mastitis (3). More recently, it was isolated during severe infections in spotted hyenas and zebras (10). No human isolate has been reported to date. Moreover, none of the 3 subspecies of S. equi has been isolated from HIV-infected patients. The current case underlines the conclusion that molecular identification of S. equi subsp. ruminatorum is essential. S. equi subsp. ruminatorum could have been underestimated due to its potential misidentification as S. equi subsp. zooepidemicus by phenotypic tools. Despite the rare occurrence of group C streptococci in human infections, a high death rate is reported for invasive infections (7–9). S. equi subsp. zooepidemicus produce superantigen exotoxin that may have been implicated in the pathogenesis of fatal infection (2); S. equi subsp. ruminatorum should also be investigated for potential virulence factors for humans.

Epidemiologic investigations were unsuccessful in tracing the patient’s infection to an animal source. The respiratory tract, from which S. equi subsp. ruminatorum was recovered in pure culture, could be considered the most probable portal of entry.

The mode of S. equi subsp. ruminatorum transmission to humans remains unknown. More information is needed on its reservoirs, but they likely resemble those of S. equi subsp. equi, and S. equi subsp. zooepidemicus (2,6,7). Prevention of human infections due to S. equi should include frequent microbiologic sampling of lactating animals and control measures for unpasteurized dairy products (7). Better characterization of underlying conditions that increase risk of invasive S. equi infections is also needed. This knowledge could help define high-risk
groups of persons and could lead to
generation of specific preventive re-
commendations.

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References
1. Popescu GA, Fuereca R, Benea E. Menin-
gitis due to an unusual human pathogen: Streptococcus equi subspecies equi. South
2. Korman TM, Boers A, Gooding TM,
Curtis N, Visvanathan K. Fatal case of
toxic shock-like syndrome due to group
C Streptococcus associated with super-
3. Fernandez E, Blume V, Garrido P, Colls
MD, Mateos A, Dominguez L, et al. Streptococcus equi subsp. ruminatorum
subsp. nov., isolated from mastitis in small
4. Carlier JP, Marchandin H, Jumas-Bilak
Anaeroglobus geminatus gen. nov., sp.
nov., a novel member of the family
5. Altschul SF, Madden TL, Schaffer AA,
BLAST and PSI-BLAST: a new genera-
tion of protein database search programs.
6. Bordes-Benitez A, Sánchez-Olóro M,
Suárez-Bordón P, García-Rojas AJ, Saéz-
Nieto JA, González-García A, et al. Out-
break of Streptococcus equi subspec.
zooepidemicus infections on the island of Gran
Canaria associated with the consumption of inadequately pasteurized cheese. Eur
J Clin Microbiol Infect Dis. 2006;25:
242–6.
M, Vuento R, Rantala L, et al. An out-
break of Streptococcus equi subspecies
zooepidemicus associated with consump-
tion of fresh goat cheese. BMC Infect Dis.
2006;6:56.
8. Bradley SF, Gordon JJ, Baumgartner DD,
Marasco WA, Kaufman CA. Group C streptococcal bacteremia: analysis of 88
9. Bateman AC, Ramsay AD, Pallett AP. Fa-
tal infection associated with group C strep-
G, Ludwig A, Fumagalli RD, et al. Se-
vvere Streptococcus infection in spotted
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Rabies Prophylaxis for Pregnant
Women

To the Editor: Rabies poses a
100% risk for death to pregnant wom-
en and an indeterminate risk to the
fetus (1,2). Although a theoretical risk
exists for adverse effects from rabbies
immune globulin and killed rabbies vi-
rus vaccines, several studies assessing the
safety of this treatment have failed to
identify these risks (3–6). Indeed,
the consensus is that pregnancy is not a
contraindication to rabies postexpo-

sion prophylaxis (PEP) (7). Despite
this concensus, healthcare providers
resist treating pregnant women with
rabies PEP. We describe a case of a
pregnant woman with uncertain rabies
severity.

A 35-year-old pregnant woman
(at 34 weeks gestation) sought treat-
ment 3 weeks after being exposed to
a bat. The patient reported awakening
at 3:00 AM to find a bat flying in her
bedroom. She attempted to confine
the bat to 1 section of the home and
then called for help. A relative trapped
and retrieved the bat, then disposed of
the animal without further incident.
The patient denied being bitten by
the bat, and she had no obvious bite
marks after the event. Initially, the
patient sought information from on-
line resources, her primary care phy-
sician, and her obstetrician. She was
uncertain whether rabies PEP was
warranted, given what she believed to
be the low probability of the bat be-
ing rabid and the low likelihood of her
having had direct exposure to the bat.
The patient did express concern about the
safety of rabies PEP in pregnant
women. Because no unequivocal rec-
ommendations were made by either
her primary care physician or obstetri-
cian, she sought further advice from
the Infectious Diseases Department at
the University of Michigan on how
best to proceed.

The 1999 recommendations of Centers for Disease Control and Pre-
vention Advisory Committee on Im-
munization Practices state, “... postex-
posure prophylaxis can be considered for persons who were in the same
room as the bat and who might be un-
aware that a bite or direct contact had
occurred ...” (8). Bat bites may not be
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