

### Acknowledgments

We thank Aurelio Velasco for reviewing the manuscript.

This work was funded by grants from Ministerio de Economía y Competitividad (AGL2010-21774) and Instituto de Salud Carlos III (MPY1411/09) from Spain to E.M. Work in the laboratory of C.A.L. is funded by the NIH (HL105694).

**Luis M. Gonzalez, Susana Rojo, Fernando Gonzalez-Camacho, Daniel Luque, Cheryl A. Lobo, and Estrella Montero**

Author affiliations: Centro Nacional de Microbiología, Majadahonda, Spain (L.-M. Gonzalez, F. Gonzalez-Camacho, D. Luque, E. Montero), Hospital Universitario Central de Asturias, Asturias, Spain (S. Rojo); and New York Blood Center, New York, New York, USA (C.A. Lobo)

DOI: <http://dx.doi.org/10.3201/eid2004.131409>

### References

- Lobo CA, Cursino-Santos JR, Alhassan A, Rodrigues M. *Babesia*: an emerging infectious threat in transfusion medicine. *PLoS Pathog*. 2013;9:e1003387. <http://dx.doi.org/10.1371/journal.ppat.1003387>
- Wormser GP, Prasad A, Neuhaus E, Joshi S, Nowakowski J, Nelson J, et al. Emergence of resistance to azithromycin-atovaquone in immunocompromised patients with *Babesia microti* infection. *Clin Infect Dis*. 2010;50:381–6.
- Gorenflot A, Moubri K, Precigout E, Carcy B, Schetters TP. Human babesiosis. *Ann Trop Med Parasitol*. 1998;92:489–501. <http://dx.doi.org/10.1080/00034989859465>
- Martinot M, Zadeh MM, Hansmann Y, Grawey I, Christmann D, Aguilon S, et al. Babesiosis in immunocompetent patients, Europe. *Emerg Infect Dis*. 2011;17:114–6. <http://dx.doi.org/10.3201/eid1701.100737>
- Malandrin L, Jouglin M, Sun Y, Brisseau N, Chauvin A. Redescription of *Babesia capreoli* (Enigk and Friedhoff, 1962) from roe deer (*Capreolus capreolus*): isolation, cultivation, host specificity, molecular characterisation and differentiation from *Babesia divergens*. *Int J Parasitol*. 2010;40:277–84. <http://dx.doi.org/10.1016/j.ijpara.2009.08.008>
- Centeno-Lima S, do Rosario V, Parreira R, Maia AJ, Freudenthal AM, Nijhof AM, et al. A fatal case of human babesiosis in Portugal: molecular and phylogenetic analysis. *Trop Med Int Health*. 2003;8:760–4. <http://dx.doi.org/10.1046/j.1365-3156.2003.01074.x>
- Corpelet C, Vacher P, Coudore F, Laurichesse H, Conort N, Souweine B. Role of quinine in life-threatening *Babesia divergens* infection successfully treated with clindamycin. *Eur J Clin Microbiol Infect Dis*. 2005;24:74–5. <http://dx.doi.org/10.1007/s10096-004-1270-x>
- Haapasalo K, Suomalainen P, Sukura A, Siikamaki H, Jokiranta TS. Fatal babesiosis in man, Finland, 2004. *Emerg Infect Dis*. 2010;16:1116–8. <http://dx.doi.org/10.3201/eid1607.091905>
- Hatcher JC, Greenberg PD, Antique J, Jimenez-Lucho VE. Severe babesiosis in Long Island: review of 34 cases and their complications. *Clin Infect Dis*. 2001;32:1117–25. <http://dx.doi.org/10.1086/319742>
- Cornillot E, Hadj-Kaddour K, Dassouli A, Noel B, Ranwez V, Vacherie B, et al. Sequencing of the smallest Apicomplexan genome from the human pathogen *Babesia microti*. *Nucleic Acids Res*. 2012;40:9102–14. <http://dx.doi.org/10.1093/nar/gks700>

Address for correspondence: Estrella Montero, Centro Nacional de Microbiología, Instituto de Salud Carlos III, Carretera Majadahonda-Pozuelo, Km 2,2, Majadahonda, Madrid, 28220, Spain; email: [estrella.montero@isciii.es](mailto:estrella.montero@isciii.es)

## Q Fever Endocarditis and New *Coxiella burnetii* Genotype, Saudi Arabia

**To the Editor.** Q fever is a worldwide zoonosis caused by an obligate intracellular bacterium, *Coxiella burnetii* (1). Q fever endocarditis is associated with surgery for 15%–73% of patients, causes death for 5%–65% of patients, and induces a large number of relapses when the endocarditis is inadequately treated (1). The most serious risk factor for endocarditis is a substantial underlying valvulopathy, but progression to endocarditis is

also found in patients with clinically silent, previously undiagnosed, valvulopathies (1). Since the 1960s, Q fever has been recognized as a public health problem in Saudi Arabia, and studies have shown that coxiellosis occurs in livestock (2,3). Only a few cases of Q fever endocarditis in Saudi Arabia have been reported (4–6). We report 2 new cases of Q fever endocarditis and detection of a new *C. burnetii* genotype in this country.

The first case was detected in 2007 in a 45-year-old man in Saudi Arabia who had fever, pneumonia, and asthenia. A transesophageal echocardiogram showed endocarditis. Results of an immunofluorescence assay were positive for *C. burnetii*; phase I titers for IgG, IgM, and IgA were 51,200, 100, and 25, respectively, and phase II titers were 102,400, 200, and 50, respectively. Serum and blood samples were negative for *C. burnetii* by real-time PCR for the IS1111 and the IS30A spacers (7). For each sample, the quality of DNA extraction was verified by real-time PCR for a housekeeping gene encoding  $\beta$ -actin (7). The aortic valve was surgically replaced, and *C. burnetii*-specific PCR results for the valve were positive. According to multispacer sequence typing (8), this *C. burnetii* isolate was a new genotype, MST51 (Figure). A *C. burnetii* isolate was cultured from the valve of this patient by the shell-vial method that used human embryonic lung cells (7). IgG anticardiolipin testing results were negative (9). The patient was given 200 mg oral doxycycline daily and 200 mg oral hydroxychloroquine 3 times daily for 18 months.

The second case was detected in 2012 in a 13-year-old boy in Saudi Arabia who had tetralogy of Fallot, a prosthetic pulmonary valve, 2 intracardiac stents, and long-term fever. Serologic testing results were positive for *C. burnetii*; phase I titers for IgG, IgM, and IgA were 51,200, 400, and 200, respectively, and phase II titers were 102,400, 800, and 400, respectively. Whereas serum and blood

samples were negative for *C. burnetii* by real-time PCR for the IS1111 and the IS30A spacers, the  $\beta$ -actin control was positive (cycle threshold <30). For this patient, we did not receive any material for culture. The patient was given 200 mg oral doxycycline daily and 200 mg oral hydroxychloroquine 3 times daily for 18 months.

To the best of our knowledge, before the 2 cases presented here, only 3 cases of Q fever endocarditis in Saudi Arabia have been described; all patients were from rural regions of Saudi Arabia and had an underlying

valvulopathy (4–6). Moreover, Q fever was not immediately suspected, and as a result, 1 patient died (6). However, for 2 other patients, valve replacement was necessary (4,5). Q fever is prevalent in Saudi Arabia, and the very high prevalence of Q fever among camels was proposed as the reason Q fever is endemic among humans in Saudi Arabia (2,3). Camels were also suspected as the probable source of acute Q fever in US soldiers returning from Saudi Arabia (10). We identified a new *C. burnetii* genotype in the aortic valve of

the first patient reported here. More epidemiologic studies are needed to determine whether this novel genotype circulating in Saudi Arabia is endemic to Saudi Arabia and whether it plays a major role in the origin of Q fever and in public health in this country.

Our studies of Q fever cases in southern France have shown that >16% of patients with acute Q fever have endocarditis and that  $\approx$ 16%–37% of patients with Q fever endocarditis could have had previous symptomatic acute Q fever infection (1). Thus, many cases of endocarditis might be avoided if patients with acute Q fever receive antimicrobial drugs as prophylaxis (1). For patients >40 years of age, transthoracic echocardiography should be performed because of the increased prevalence of valvulopathy and Q fever endocarditis in this population (9). As a result, more studies are needed to determine whether our data can affect local clinical practice.

**Emmanouil Angelakis,  
Sameer Johani, Azeem Ahsan,  
Ziad Memish, and Didier Raoult**

Author affiliations: Unité de Recherche sur les Maladies Infectieuses et Tropicales Émergentes, Marseille, France (E. Angelakis, D. Raoult); King Saud Bin Abdul Aziz University for Health Science, Jeddah, Saudi Arabia (S. Johani, D. Raoult); King Fahd Medical City, Riyadh, Saudi Arabia (A. Ahsan); and Ministry of Health, Riyadh (Z. Memish)

DOI: <http://dx.doi.org/10.3201/eid2004.131603>

## References

1. Million M, Walter G, Thuny F, Habib G, Raoult D. Evolution from acute Q fever to endocarditis is associated with underlying valvulopathy and age and can be prevented by prolonged antibiotic treatment. *Clin Infect Dis*. 2013;57:836–44. <http://dx.doi.org/10.1093/cid/cit419>
2. Gelpi AP. Q fever in Saudi Arabia. *Am J Trop Med Hyg*. 1966;15:784–98.
3. Greth A, Calvez D, Vassart M, Lefevre PC. Serological survey for bovine bacterial and viral pathogens in captive Arabian oryx (*Oryx leucoryx* Pallas, 1776). *Rev Sci Tech*. 1992;11:1163–8.

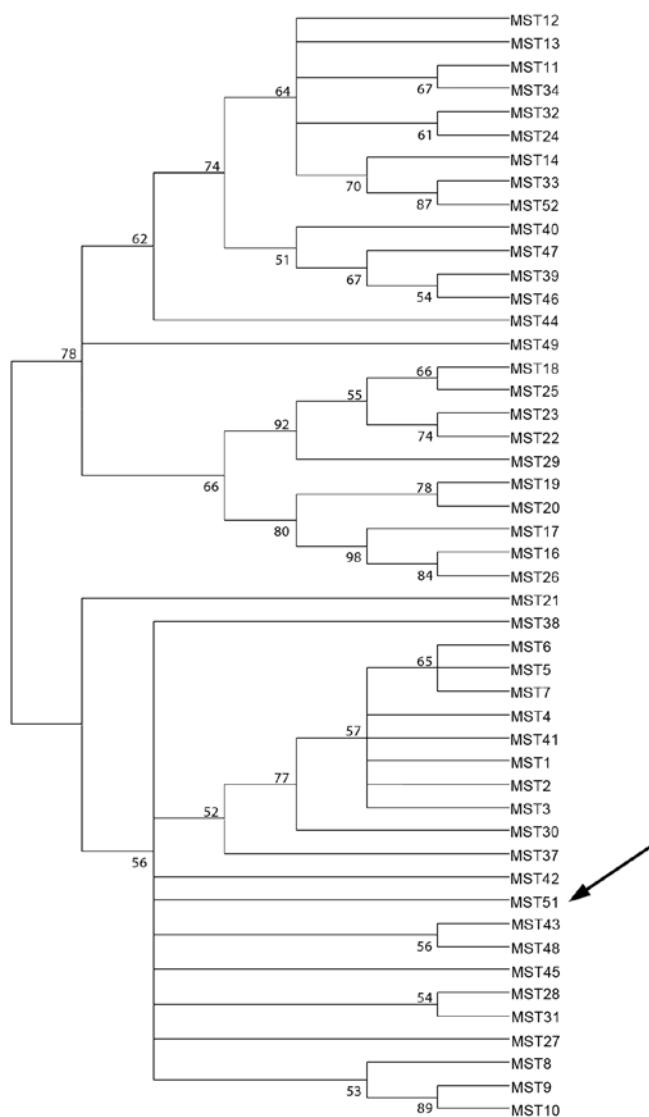


Figure. Neighbor-joining tree of *Coxiella burnetii* genotypes determined by multispacer sequence typing. Arrow indicates new genotype in Saudi Arabia.

4. Ross PJ, Jacobson J, Muir JR. Q fever endocarditis of porcine xenograft valves. *Am Heart J*. 1983;105:151–3. [http://dx.doi.org/10.1016/0002-8703\(83\)90293-4](http://dx.doi.org/10.1016/0002-8703(83)90293-4)
5. al-Hajjar S, Hussain Qadri SM, al-Sabban E, Jager C. *Coxiella burnetii* endocarditis in a child. *Pediatr Infect Dis J*. 1997;16:911–3. <http://dx.doi.org/10.1097/00006454-199709000-00020>
6. Saginur R, Silver SS, Bonin R, Carlier M, Orizaga M. Q-fever endocarditis. *CMAJ*. 1985;133:1228–30.
7. Angelakis E, Richet H, Rolain JM, La SB, Raoult D. Comparison of real-time quantitative PCR and culture for the diagnosis of emerging rickettsioses. *PLoS Negl Trop Dis*. 2012;6:e1540.
8. Angelakis E, Million M, D'Amato F, Rouli L, Richet H, Stein A, et al. Q fever and pregnancy: disease, prevention, and strain specificity. *Eur J Clin Microbiol Infect Dis*. 2013;32:361–8.
9. Million M, Walter G, Bardin N, Camoin L, Giorgi R, Bongrand P, et al. Immunoglobulin G anticardiolipin antibodies and progression to Q fever endocarditis. *Clin Infect Dis*. 2013;57:57–64. <http://dx.doi.org/10.1093/cid/cit191>
10. Hussein MF, Al-Khalifa IM, Aljumaah RS, Gar Elnabi A, Mohammed OB, Omer SA, et al. Serological prevalence of *Coxiella burnetii* in captive wild ruminants in Saudi Arabia. *Comparative Clinical Pathology*. 2012;21:33–8. <http://dx.doi.org/10.1007/s00580-010-1061-y>

Address for correspondence: Didier Raoult, URMITE UMR 6236, CNRS-IRD, Faculté de Médecine, 27 Blvd Jean Moulin, 13385 Marseille Cedex 05, France; email: didier.raoult@gmail.com

### The Public Health Image Library (PHIL)



The Public Health Image Library (PHIL), Centers for Disease Control and Prevention, contains thousands of public health-related images,

including high-resolution (print quality) photographs, illustrations, and videos.

PHIL collections illustrate current events and articles, supply visual content for health promotion brochures, document the effects of disease, and enhance instructional media.

PHIL Images, accessible to PC and Macintosh users, are in the public domain and available without charge.

Visit PHIL at <http://phil.cdc.gov/phil>

## Lack of MERS Coronavirus but Prevalence of Influenza Virus in French Pilgrims after 2013 Hajj

**To the Editor:** Saudi Arabia has reported the highest number of Middle East respiratory syndrome coronavirus (MERS-CoV) cases since the virus first emerged in 2012, with >127 confirmed cases and a case-fatality rate of 42%, as of November 2013 (1). Global attention has focused on the potential for spread of MERS-CoV after the Hajj pilgrimage during which Muslims from 180 countries converge in Mecca, Saudi Arabia. Such pilgrims have a high risk for respiratory tract infections because of severe overcrowding. The International Health Regulations Emergency Committee advised all countries (particularly those with returning pilgrims) to strengthen their surveillance capacities and ensure robust reporting of any identified cases (2).

We report the results of a prospective cohort study conducted in Saudi Arabia in October 2013. Participants in the survey were adult Hajj pilgrims who traveled together in a group (through 1 travel agency in Marseille, France) from October 3 through October 24, 2013. Pilgrims were included in the study on a voluntary basis and were asked to sign a written consent form. All pilgrims received advice about individual prevention measures against respiratory tract infection before departing, and follow-up was conducted during the journey by a medical doctor who systematically documented travel-associated diseases. Nasal swab specimens were obtained just before the pilgrims left Saudi Arabia, frozen <48 hours after sampling, and processed (3,4). Each sample was tested for MERS-CoV (upE and ORF1a genes) (5,6) and influenza A, B (7), and A/2009/H1N1

viruses (8) by real-time reverse transcription PCR. The protocol was approved by our Institutional Review Board (July 23, 2013; reference no. 2013-A00961–44) and by the Saudi Ministry of Health ethics committee.

On departure from France, the study comprised 129 pilgrims. Their mean age was 61.7 years (range 34–85 years), and the male/female ratio was 0.7:1. Sixty-eight (52.7%) pilgrims reported having a chronic disease, including hypertension (43 [33.3%]), diabetes (34 [26.4%]), chronic cardiac disease (11 [8.5%]), and chronic respiratory disease (5 [3.9%]). Forty-six (35.7%) pilgrims reported receiving influenza vaccination in 2012; none had been vaccinated in 2013 before the Hajj because the vaccine was not yet available in France.

Clinical data were available for 129 persons: 117 (90.7%) had respiratory symptoms while in Saudi Arabia, including cough (112 [86.8%]) and sore throat (107 [82.9%]); 64 (49.6%) reported fever, and 61 (47.3%) had conditions that met the criteria for influenza-like illness (ILI; i.e., the association of cough, sore throat, and subjective fever) (Figure) (4). One patient was hospitalized during travel (undocumented pneumonia). Nasal swab specimens were obtained from 129 pilgrims on October 23, 2013 (week 43), 1 day before pilgrims left Saudi Arabia for France; 90 (69.8%) pilgrims were still symptomatic. All PCRs were negative for MERS-CoV.

Eight pilgrims tested positive for influenza A(H3N2), 1 for influenza A(H1N1), and 1 for influenza B virus. No dual infections were reported. 70 (54.3%) pilgrims were seen 3–5 weeks after they returned to France, and the remaining were lost to follow-up. Fifty-five (78.6%) had experienced respiratory symptoms since their return, including cough (50 [71.4%]) and sore throat (14 [20.0%]); 12 (17.1%) reported fever, and illness in 5 (7.1%) pilgrims met the criteria for ILI. The 10 pilgrims who had positive test