

## Meningoencephalitis Complicating Relapsing Fever in Traveler Returning from Senegal

**To the Editor:** Although tick-borne relapsing fever (TBRF) may be caused by  $\approx 20$  *Borrelia* species (1), it is rarely diagnosed in travelers returning from the tropics (2). Approximately 20 travel-related cases have been published in the past 25 years, and most of them have been acquired in western Africa (mainly Senegal), where *Borrelia crociduræ* is the predominant species (3). All reported cases have been diagnosed by identification of spirochetes in blood smears or by quantitative buffy coat analysis. Neurologic involvement, which is frequent in TBRF (4), was reported for 3 confirmed travel-associated cases (5–7) and for 2 additional clustered cases not confirmed by microscopy (8). We report a case of acute meningoencephalitis in a returning traveler for whom TBRF was diagnosed by only PCR of serum and cerebrospinal fluid (CSF).

In December 2010, a 26-year-old Belgian woman was referred to the intensive care unit of the University Hospital of Antwerp, Belgium, because of fever and headache for 7 days and abrupt neurologic deterioration the day before admission. One month earlier, she had returned from a 3-week adventure trip to a rural area near Bambey, 120 km east of Dakar, Senegal. Immunization and malaria chemoprophylaxis had been appropriate. Diarrhea and fever developed the day she returned. She was empirically treated with ofloxacin for 5 days and recovered.

At admission, she reported high-grade fever, headache, and photophobia. She was somnolent, inadequate in her answers, and had neck stiffness. Laboratory investigations

showed a leukocyte count of  $20 \times 10^9$  cells/L (82% neutrophils) and a C-reactive protein level of 190 mg/L. Blood smears were repeatedly negative. Magnetic resonance imaging of the brain showed no abnormalities. CSF contained 350 leukocytes/mm<sup>3</sup> (95% lymphocytes) and had a protein level of 125 mg/dL.

Acyclovir, ceftriaxone, ampicillin, and doxycycline were empirically administered. A rash developed abruptly, and the patient became hypotensive and extremely agitated. Treatment with ampicillin was stopped because of a suspected allergic reaction. Blood and CSF cultures remained negative. Results of molecular testing of CSF for herpesvirus and enteroviruses were negative.

The patient recovered uneventfully after a 14-day course of ceftriaxone. Paired serologic samples did not show seroconversion for HIV, *Treponema pallidum*, cytomegalovirus, dengue virus, West Nile virus, *Toxoplasma gondii*, *Rickettsia* spp., *Coxiella burnetii*, *Leptospira* sp., and *B. burgdorferi*.

At the Université de la Méditerranée in Marseille, France, DNA samples from CSF and acute-phase and convalescent-phase serum samples were tested by using quantitative real-time PCR specific for a fragment of the 16S rRNA gene of *Borrelia* spp. (9). *Borrelia*-positive results were confirmed by using *Borrelia*-specific quantitative PCR specific for the internal transcribed spacer and primers Bor\_ITS4\_F: 5'GGCTT CGGGTCTACCACATCTA-3' and Bor\_ITS4\_R: 5'-CCGGGAGGGGAG TGAAATAG-3' and probe Bor\_ITS4\_P: 5'-6FAM-TGCAAAAGGCACGCC ATCACC-TAMRA-3'.

An amplicon of 202 bp was obtained from a CSF DNA sample after amplification and sequencing of the flagellin B gene with primer set Bfpbu: 5'-GCTGAAGAGCTTGGAAT GCAACC-3' and Bfpcr: 5'-TGATCA

GTTATCATTCTAATAGCA-3'. This amplicon showed 100% similarity with sequences available in GenBank for *B. crociduræ* (accession no. GU357619). Indirect immunofluorescence with *B. crociduræ* antigen showed positive bands for IgM and IgG (Table).

*B. crociduræ* has emerged as a major zoonotic pathogen in rural western Africa and accounts for 5%–25% of febrile illnesses depending on year and location (3,9,10). Transmission occurs through nocturnal bites of soft ticks (*Ornithodoros sonrai*), which colonize rodent burrow openings in mud-built huts and houses with cement floors (1). Therefore, TBRF should be considered in any symptomatic traveler in disease-endemic areas.

We identified *B. crociduræ* DNA in the CSF of a patient with meningoencephalitis complicating relapsing fever. Meningitis and meningoencephalitis may develop in persons with travel-related TBRF (5–8). The neurologic outcome was favorable after treatment with ceftriaxone for 14 days (4), and relapse was not observed. Negative blood smears, even when repeated and read by laboratory experts, do not rule out TBRF. Recent studies have demonstrated that sensitivity of blood smear examination performed by trained microscopists does not exceed 50% compared with PCR methods (9) and is much lower in field settings (9,10). Abrupt deterioration (rash, hypotension, and increased encephalopathy) after treatment with antimicrobial drugs was probably related to a Jarish-Herxheimer reaction (4). This reaction was not immediately considered but was easily controlled by supportive treatment in the intensive care unit. The noninvestigated episode of fever upon return of the patient may have been the initial fever episode of TBRF, but it was lessened by the short course of ofloxacin (4). Absence of laboratory workup could have caused serious infections to be missed.

Table. Test results for 26-year-old woman who returned to Belgium from Senegal with meningoencephalitis complicating relapsing fever\*

Characteristic	Date and test result	
	2010 Dec 21	2011 Jan 25
<i>Borrelia</i> DNA in serum	+ for 16S rRNA and ITS4 genes	-
<i>Borrelia</i> DNA in CSF	+ (100% similarity to <i>B. crocidurae flaB</i> gene; GenBank accession no. GU357619)	-
<i>B. crocidurae</i> IgM titer	25	0
<i>B. crocidurae</i> IgG titer	400	400
<i>B. duttonii</i> IgM titer	0	0
<i>B. duttonii</i> IgG titer	200	200
<i>B. recurrentis</i>	-	-
<i>B. burgdorferi</i>	-	-

\*+, positive; ITS, internal transcribed spacer; -, negative; CSF, cerebrospinal fluid; *fla*, flagellin.

In conclusion, this case indicates an unusual complication and condition in travel medicine with no straightforward diagnosis. However, it illustrates that TBRF should be systematically considered in the differential diagnosis of acute meningoencephalitis in travelers, even if microscopic results are negative, to prompt appropriate empirical treatment and molecular or serologic testing.

**Emmanuel Bottieau,  
Eric Verbruggen, Camille Aubry,  
Cristina Socolovschi,  
and Erika Vlieghe**

Author affiliations: Institute of Tropical Medicine, Antwerp, Belgium (E. Bottieau, E. Vlieghe); University Hospital of Antwerp, Antwerp (E. Verbruggen, E. Vlieghe); and Université de la Méditerranée, Marseilles, France (C. Aubry, C. Socolovschi)

DOI: <http://dx.doi.org/10.3201/eid1804.111771>

## References

- Cutler SJ. Possibilities for relapsing fever reemergence. *Emerg Infect Dis.* 2006;12:369–74. <http://dx.doi.org/10.3201/eid1203.050899>
- Bottieau E, Clerinx J, Schrooten W, Van den Enden E, Wouters R, Van Esbroeck M, et al. Etiology and outcome of fever after a stay in the tropics. *Arch Intern Med.* 2006;166:1642–8. <http://dx.doi.org/10.1001/archinte.166.15.1642>
- Vial L, Diatta G, Tall A, Ba el H, Bouganali H, Durand P, et al. Incidence of tick-borne relapsing fever in west Africa: longitudinal study. *Lancet.* 2006;368:37–43. [http://dx.doi.org/10.1016/S0140-6736\(06\)68968-X](http://dx.doi.org/10.1016/S0140-6736(06)68968-X)
- Cadavid D, Barbour AG. Neuroborreliosis during relapsing fever: review of the clinical manifestations, pathology, and treatment of infections in humans and experimental animals. *Clin Infect Dis.* 1998;26:151–64. <http://dx.doi.org/10.1086/516276>
- Charmot G, Rodhain F, Dupont B, Sansonetti P, Lapresle C. Meningoencephalitis in a repatriate from Senegal. Think of borreliosis [in French]. *Presse Med.* 1986;15:979.
- Colebunders R, De Serrano P, Van Gompel A, Wynants H, Blot K, Van den Enden E, et al. Imported relapsing fever in European tourists. *Scand J Infect Dis.* 1993;25:533–6. <http://dx.doi.org/10.3109/00365549309008539>
- van Dam AP, Van Gool T, Wetsteyn JC, Dankert J. Tick-borne relapsing fever imported from west Africa: diagnosis by quantitative buffy coat analysis and in vitro culture of *Borrelia crocidurae*. *J Clin Microbiol.* 1999;37:2027–30.
- Patrat-Delon S, Drogoul AS, Le Ho H, Biziraguzenyuka J, Rabier V, Arvieux C, et al. Recurrent tick-borne fever: a possible diagnosis in patients returning from Senegal [in French]. *Med Mal Infect.* 2008;38:396–9.
- Parola P, Diatta G, Socolovschi C, Mediannikov O, Tall A, Bassene H, et al. Tick-borne relapsing fever borreliosis, rural Senegal. *Emerg Infect Dis.* 2011;17:883–5.
- Nordstrand A, Bunikis I, Larsson C, Tsogbe K, Schwan TG, Nilsson M, et al. Tickborne relapsing fever diagnosis obscured by malaria, Togo. *Emerg Infect Dis.* 2007;13:117–23. <http://dx.doi.org/10.3201/eid1301.060670>

Address for correspondence: Emmanuel Bottieau, Department of Clinical Sciences, Institute of Tropical Medicine, Nationalestraat 155, Antwerp 2000, Belgium; email: [ebottieau@itg.be](mailto:ebottieau@itg.be)

## Serologic Evidence of Orthopoxvirus Infection in Buffaloes, Brazil

**To the Editor:** Since 1999, several exanthematous vaccinia virus (VACV) outbreaks affecting dairy cattle and rural workers have been reported in Brazil (1,2). VACV, the prototype of the genus *Orthopoxvirus* (OPV), exhibits serologic cross-reactivity with other OPV species and was used during the World Health Organization smallpox eradication campaign (3). The origin of VACV in Brazil is unknown, although some studies have suggested that VACV strains used during the campaign may be related to outbreaks of bovine vaccinia (BV) (2). In Brazil, BV affects the milk industry and public health services (1,2,4,5). During outbreaks, dairy cattle developed lesions on the teats and udders, causing a decrease in milk production (1,2,4,5).

Another VACV subspecies, buffalopox virus (BPXV), has been isolated from buffaloes (*Bubalus bubalis*) in rural areas in India and causes clinical signs that resemble those seen during BV outbreaks in Brazil (6). Recent genetic analysis of BPXV samples confirmed its close relationship to VACV-like viruses, although each virus has distinct genetic signatures (1,2,6). Until recently, buffalo herds have been almost exclusive to northern Brazil. However, the buffalo market has experienced great expansion in this country, and today, there are herds in all geographic regions of Brazil. These buffalo herds are hypothetically at risk for VACV infection, on the basis of the outbreaks caused by BPXV that have been described in India (6). To assess the risk for OPV infection in milk buffaloes in Brazil, we conducted a serosurvey of herds from southeastern Brazil, the region most affected by BV.