

## Human Colorado tick fever in southern Alberta

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**T**he Colorado tick fever virus has been isolated predominantly in the Rocky Mountain regions of the United States and Canada. *Dermacentor andersoni* is the usual vector in zoonotic cycles, although other tick species may be involved. Infected vectors have been identified in southern regions of Alberta, British Columbia and Saskatchewan,<sup>1-3</sup> however, we present a case of human infection believed to be the first laboratory-confirmed case in Canada.

### Case report

A 20-year-old woman in southwestern Alberta presented to her physician on May 22, 1986. She had removed a tick from her neck earlier that day. The entire tick had apparently been removed. She was in otherwise good health and denied having travelled during the preceding week, apart from a trip to the nearby Livingstone Range of the Rocky Mountains the day before.

Fever and headache developed 24 to 36 hours after the tick had been noticed; chills, generalized aches, nausea, a stiff neck and hallucinations also occurred. After 48 hours the patient returned to her physician, and penicillin was prescribed. Because the fever and generalized illness continued over the next few days tetracycline was substituted for the penicillin. Five days after the initial presenta-

tion the fever remitted, but the patient became increasingly confused and suffered memory loss. A diagnosis of viral encephalitis was considered, and she was transferred to a tertiary care hospital.

The patient was found to be afebrile, oriented and lucid, and the findings at physical examination were unremarkable. She continued to take tetracycline for 10 days and remained well thereafter. Neither a rash nor the return of fever was noted.

Blood samples drawn on admission to hospital revealed a leukocyte count of  $2.4 \times 10^9/L$ . Spirochetes were not observed in a blood smear. Tests on serum samples obtained in the acute and convalescent phases of the illness (May 27 and June 11 respectively) for antibodies to spotted-fever rickettsiae, *Coxiella burnetii*, *Francisella tularensis*, *Borrelia burgdorferi*, *Ehrlichia canis* and Powassan virus gave negative results. The serum obtained June 11 contained significant amounts of antibody to Colorado tick fever virus, as determined by an IgM antibody capture enzyme-linked immunosorbent assay (MACELISA).<sup>4</sup> A serum sample obtained 1 year later had a high titre of neutralizing antibody (Table I).

### Comments

Colorado tick fever is a febrile, usually benign, systemic illness.<sup>5,6</sup> The incubation period averages 4 days but can vary from less than 24 hours to 14 days. The illness may last as long as 1½ weeks, and symptoms can include a biphasic fever, chills, fatigue, headache, myalgia, and ocular and gastrointestinal disorders. Central nervous system (CNS) involvement (e.g., meningitis and encephalitis) has been well documented in children,<sup>5-9</sup> and neck stiffness is seen in up to 20% of adults with this illness.<sup>6</sup> Although the cerebrospinal fluid was not examined in this case, the patient's neck stiffness, hallucinations, disorientation and memory loss suggest that the CNS was involved.

Few physical findings, apart from fever, are

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observed; however, a macular rash without well-defined distribution has been seen in about 10% of the cases and may cause physicians to consider a diagnosis of Rocky Mountain spotted fever. Less common presentations include arthritis, hemorrhagic diathesis, carditis, orchitis and pneumonia.<sup>5,6,10,11</sup> The peak incidence is usually from May to July.

Laboratory studies are usually not helpful except in detecting leukopenia. Pleocytosis may be observed in cases of CNS involvement. The diagnosis is confirmed by isolation of the virus from blood or cerebrospinal fluid inoculated into either suckling mice or cell cultures or by serologic techniques, which are more practical in Canada. Blood samples should be collected on or about the day of onset of the illness and then 2 to 3 weeks later and submitted to a local or provincial public health laboratory; a clinical suspicion of Colorado tick fever should be emphasized in the accompanying request.

The replication cycle of the Colorado tick fever virus is maintained between the tick vector *D. andersoni* and various mammals.<sup>12-14</sup> Human infection is acquired from the bite of an infected adult tick. Surveys in British Columbia have documented a low prevalence of seropositivity for complement fixing or neutralizing antibody to Colorado tick fever virus in humans,<sup>15-17</sup> but none of the positive serum samples were from patients with acute disease.

The Colorado tick fever virus and its principal vector have long been recognized in western Canada.<sup>1-3</sup> Although anecdotal reports of suspected infection in humans in Alberta have circulated informally for many years, we believe that the case described here is the first laboratory-confirmed one in Canada and hope that this report will heighten physicians' awareness of this disease in the western provinces. In view of the potentially prolonged incubation period Colorado tick fever may present elsewhere in Canada and should be considered when there is a history of a tick bite and travel to an enzootic area.

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Table 1 — Serologic profile of a woman with Colorado tick fever

Date of blood collection	Test results		
	MACELISA*	Complement fixation†	Neutralization test‡
May 27, 1986	1.82	< 8	< 20
June 11, 1986	6.05	< 8	20
July 10, 1987	Not done	Not done	> 640

\*MACELISA = IgM antibody capture enzyme-linked immunosorbent assay. Result expressed as ratio of value for patient's serum to value for normal serum; a ratio of 2.00 or greater is considered to indicate an antibody response to infection.

†Values represent reciprocal of serum dilution.

‡Serum dilution-plaque reduction neutralization test done in Vero cells; values represent reciprocal of serum dilution.