



## Travelers' Health: Yellow Book

CDC Health Information for International Travel 2008

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## Chapter 4 Prevention of Specific Infectious Diseases

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### Rickettsial Infections

#### Description

Many species of Rickettsia can cause illnesses in humans (Table 4-18). The term "rickettsiae" conventionally embraces a polyphyletic group of microorganisms in the class Proteobacteria, comprising species belonging to the genera *Rickettsia*, *Orientia*, *Ehrlichia*, *Anaplasma*, *Neorickettsia*, *Coxiella*, and *Bartonella*. These agents are usually not transmissible directly from person to person except by blood transfusion or organ transplantation, although sexual and placental transmission has been proposed for *Coxiella*. Transmission generally occurs via an infected arthropod vector or through exposure to an infected animal reservoir host. However, sennetsu fever is acquired following consumption of raw fish products. The clinical severity and duration of illnesses associated with different rickettsial infections vary considerably, even within a given antigenic group. Rickettsioses range in severity from diseases that are usually relatively mild (rickettsialpox, cat scratch disease, and African tick-bite fever) to those that can be life-threatening (epidemic and murine typhus, Rocky Mountain spotted fever, scrub typhus and Oroya fever), and they vary in duration from those that can be self-limiting to chronic (Q fever and bartonellosis) or recrudescient (Brill-Zinsser disease). Most patients with rickettsial infections recover with timely use of appropriate antibiotic therapy.

Travelers may be at risk for exposure to agents of rickettsial diseases if they engage in occupational or recreational activities which bring them into contact with habitats that support the vectors or animal reservoir species associated with these pathogens (1-2).

#### Occurrence and Risk for Travelers

The geographic distribution and the risks for exposure to rickettsial agents are described below and in Table 4-18 by disease.

##### EPIDEMIC TYPHUS AND TRENCH FEVER

Epidemic typhus and trench fever, which are caused by *Rickettsia prowazkeii* and *Bartonella quintana*, respectively, are transmitted from one person to another by the human body louse (3-4). Contemporary outbreaks of both diseases are rare in most developed countries and generally occur only in communities and populations in which body louse infestations are frequent, especially during the colder months when louse-infested clothing is not laundered. Foci of trench fever have also been recognized among homeless populations in urban centers of industrialized countries. Travelers who are not at risk of exposure to body lice or to persons with lice are unlikely to acquire these illnesses. However, health-care workers who care for these patients may be at risk for acquiring louse-borne illnesses through inhalation or inoculation of infectious louse feces into the skin or conjunctiva. In the eastern United States, campers, inhabitants of wooded areas, and wildlife workers can acquire sylvatic epidemic typhus if they come in close contact with flying squirrels, their ectoparasites, or their nests, which can be made in houses, cabins, and tree-holes.

##### MURINE TYPHUS AND CAT-FLEA RICKETTSIOSIS

Murine typhus, which is caused by infection with *Rickettsia typhi*, is transmitted to humans by rat fleas, particularly during exposure in rat-infested buildings (3). Flea-infested rats can be found throughout the year in humid tropical environments, especially in harbor or riverine environments. In temperate regions, they are most common during the warm summer months. Similarly, cat-flea rickettsiosis, which is caused by infection with *Rickettsia felis*, occurs worldwide from exposure to flea-infested domestic cats and dogs, as well as peridomestic animals, and is responsible for a murine typhus-like febrile disease in humans.

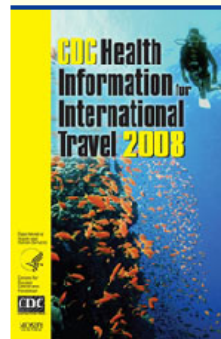
##### SCRUB TYPHUS

Mites ("chiggers") transmit *Orientia tsutsugamushi*, the agent of scrub typhus, to humans (5). These mites occur year-round in a large area from South Asia to Australia and in much of East Asia, including Japan, China, Korea, Maritime Provinces and Sakhalin Island of Russia, and Tajikistan. Their prevalence, however, fluctuates with temperature and rainfall. Infection may occur on coral atolls in both the Indian and Pacific Oceans, in rice paddies and along canals and fields, on oil palm

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prairies, in tropical to desert climates and in elevated river valleys. Humans typically encounter the arthropod vector of scrub typhus in recently disturbed habitat (e.g., forest clearings) or other persisting mite foci infested with rats and other rodents.

### TICK-BORNE RICKETTSIOSES

Tick-borne rickettsial diseases are most common in temperate and subtropical regions (6). These diseases include numerous well-known classical spotted fever rickettsioses (7) and an expanding group of newly recognized diseases (Table 4-18) (6,8). In general, peak transmission of tick-borne rickettsial pathogens occurs during spring and summer months. Travelers who participate in outdoor activities in grassy or wooded areas (e.g., trekking, camping, or going on safari) may be at risk for acquiring tick-borne illnesses, including those caused by *Rickettsia*, *Anaplasma*, and *Ehrlichia* species (see below) (2,7).

### Rickettsialpox

Rickettsialpox is generally an urban, mite-vector disease associated with *R. akari*-infected house mice, although feral rodent-mite reservoirs also have been described (3). Outbreaks of this illness have occurred shortly after rodent extermination programs or natural viral infections that depleted rodent populations and caused the mites to seek new hosts. *R. akari*-infected rodents have been found in urban centers in the former Soviet Union, South Africa, Korea, Croatia, and the United States. Travelers may be at risk for exposure to rodent mites when staying in old urban hostels and cabins.

### ANAPLASMOSIS AND EHRLICHIOSIS

Human ehrlichiosis and anaplasmosis are acute tick-borne diseases, associated with the lone star tick, *Amblyomma americanum*, and *Ixodes* ticks, respectively (3,7). Because one tick may be infected with more than one tick-borne pathogen (e.g. *Borrelia burgdorferi*, the causative agent of Lyme disease, or various *Babesia* species, agent of human babesiosis), patients may present with atypical clinical symptoms that complicate treatment. Ehrlichioses and anaplasmosis are characterized by infection of different types of leukocytes, where the causative agent multiplies in cytoplasmic membrane-bound vacuole called morulae. Morulae can sometimes be detected in Giemsa-stained blood smears.

### Q FEVER

Q fever occurs worldwide, most often in persons who have contact with infected goat, sheep, cat and cattle, particularly parturient animals (especially farmers, veterinarians, butchers, meat packers, and seasonal workers) (1,3). Travelers who visit farms or rural communities can be exposed to *Coxiella burnetii*, the agent of Q fever, through airborne transmission (via animal-contaminated soil and dust) or less commonly through consumption of unpasteurized milk products or by exposure to infected ticks. These infections may initially result in only mild and self-limiting influenza-like illnesses, but if untreated, infections may become chronic, particularly in persons with preexisting heart valve abnormalities or with prosthetic valves. Such persons can develop chronic and potentially fatal endocarditis.

### CAT-SCRATCH DISEASE AND OROYA FEVER

Cat-scratch disease is contracted through scratches and bites from domestic cats, particularly kittens, infected with *Bartonella henselae*, and possibly from their fleas (3,4). Exposure can therefore occur wherever cats are found. Oroya fever is transmitted by sandflies infected with *B. bacilliformis*, which is endemic in the Andean highlands.

### Clinical Presentation

Clinical presentations of rickettsial illnesses vary (Table 4-18), but common early symptoms, including fever, headache, and malaise, are generally nonspecific (1-4). Illnesses resulting from infection with rickettsial agents may go unrecognized or are attributed to other causes. Atypical presentations are common and may be expected with poorly characterized nonindigenous agents (4,5,8,9), so appropriate samples for examination by specialized reference laboratories should be obtained. A diagnosis of rickettsial diseases is based on two or more of the following: 1) clinical symptoms and an epidemiologic history compatible with a rickettsial disease, 2) the development of specific convalescent-phase antibodies reactive with a given pathogen or antigenic group, 3) a positive polymerase chain reaction test result, 4) specific immunohistologic detection of rickettsial agent, or 5) isolation of a rickettsial agent. Ascertaining the likely place and the nature of potential exposures is particularly helpful for accurate diagnostic testing.

### Prevention

With the exception of the louse-borne diseases described above, for which contact with infectious arthropod feces is the primary mode of transmission (through autoinoculation into a wound, conjunctiva, or inhalation), travelers and health-care providers are generally not at risk for becoming infected via exposure to an ill person. Limiting exposures to vectors or animal reservoirs remains the best means for reducing the risk for disease. Travelers should be advised that prevention is based on avoidance of vector-infested habitats, use of repellents and protective clothing (see Chapter 2), prompt detection and removal of arthropods from clothing and skin, and attention to hygiene (7).

Q fever and *Bartonella* group diseases may pose a special risk for persons with abnormal or prosthetic heart valves, and *Rickettsia*, *Ehrlichia*, and *Bartonella* for persons who are immunocompromised.

### Treatment

Treatments for most rickettsial illnesses are similar and include administration of appropriate antibiotics (e.g., tetracyclines, chloramphenicol, azithromycin, fluoroquinolones, and rifampin) and supportive care. Treatment should usually be given empirically prior to disease confirmation, and the particular antimicrobial agent and the length of treatment are dependent upon the disease and the host. No licensed vaccines for prevention of rickettsial infections are commercially available in the United States.

## References

1. Imbert P, Rapp C, Jagou M, Saillol A, Debord T. Q fever in travelers: 10 cases. *J Travel Med.* 2004;11(6):383-5.
2. Jensenius M, Fournier PE, Raoult D. Tick-borne rickettsioses in international travellers. *Int J Infect Dis.* 2004;8(3):139-46.
3. Comer JA, Paddock CD, Childs JE. Urban zoonoses caused by *Bartonella*, *Coxiella*, *Ehrlichia*, and *Rickettsia* species. *Vector Borne Zoonotic Dis.* 2001;1(2):91-118.
4. Rolain JM, Brouqui P, Koehler JE, Maguina C, Dolan MJ, Raoult D. Recommendations for treatment of human infections caused by *Bartonella* species. *Antimicrob Agents Chemother.* 2004;48(6):1921-33.
5. Watt G, Parola P. Scrub typhus and tropical rickettsioses. *Curr Opin Infect Dis.* 2003;16(5):429-36.
6. Parola P, Paddock CD, Raoult D. Tick-borne rickettsioses around the world: emerging diseases challenging old concepts. *Clin Microbiol Rev.* 2005;18(4):719-56.
7. Chapman AS, Bakken JS, Folk SM, Paddock CD, Bloch KC, Krusell A, et al. Diagnosis and management of tick-borne rickettsial diseases in the United States: Rocky Mountain spotted fever, ehrlichiosis and anaplasmosis. A primer for physicians and other health care professionals. *MMWR Recomm Rep.* 2006;55(RR-4):1-29.
8. Oteo JA, Ibarra V, Blanco JR, Martinez de Artoia V, Marquez FJ, Portillo A, et al. *Dermacentor*-borne necrosis erythema and lymphadenopathy: clinical and epidemiological features of a new tick-borne disease. *Clin Microbiol Infect.* 2004;10(4):327-31.
9. Zaidi SA, Singer C. Gastrointestinal and hepatic manifestations of tick-borne diseases in the United States. *Clin Infect Dis.* 2002; 34:1206-12.

MARINA E. EREMEEVA, GREGORY A. DASCH

**TABLE 4-18. Epidemiologic features and symptoms of rickettsial diseases**

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
Typhus fevers	Epidemic typhus,	<i>Rickettsia prowazekii</i>	Headache, chills, fever, prostration, confusion, photophobia, vomiting, rash (generally starting on trunk)	Human body louse, squirrel flea and louse	Humans, flying squirrels (US)	Cool mountainous regions of Africa, Asia, and Central and South America
	Sylvatic typhus					
	Murine typhus	<i>R. typhi</i>	As above, generally less severe	Rat flea	Rats, mice	Worldwide
Spotted fevers	African tickbite fever	<i>R. africae</i>	Fever, eschar (s), regional adenopathy, maculopapular or vesicular rash subtle or absent	Tick	Rodents	Sub-Saharan Africa
	Aneruptive fever	<i>R. helvetica</i>	Fever, headache, myalgia	Tick	Rodents	Old World
	Australian spotted fever	<i>R. marmionii</i>	Fever, eschar, maculopapular or vesicular rash, adenopathy	Tick	Rodents, reptiles	Australia
	Cat flea rickettsiosis	<i>R. felis</i>	As murine typhus, generally less severe	Cat and dog fleas	Domestic cats, opossums	Europe, South America
	Far Eastern spotted fever	<i>R. heilongjiangensis</i>	Fever, eschar, macular or maculopapular rash, lymphadenopathy enlarged lymph nodes	Tick	Rodents	Far East of Russia, Northern China
	Flinders Island spotted fever, Thai tick typhus	<i>R. honei</i>	Mild spotted fever, eschar and adenopathy are rare	Tick	Not defined	Australia, Thailand
	Lymphangitis associated rickettsiosis	<i>R. sibirica</i> subsp. <i>mongolotimonae</i>	Fever, multiple eschars, regional adenopathy and lymphangitis, maculopapular rash	Tick	Rodents	Southern France, Portugal, Asia, Africa
	Maculatum	<i>R. parkeri</i>	Fever, eschar	Tick	Rodents	Brazil, Uruguay

	infection		rash maculopapular to vesicular			
	Mediterranean spotted fevers‡	<i>R. conorii</i>	Fever, eschar, regional adenopathy, maculopapular rash on extremities	Tick	Dogs, rodents	Africa, India, Europe, Middle East, Mediterranean
	North Asian tick typhus	<i>R. sibirica</i>	Fever, eschar (s), regional adenopathy, maculopapular rash	Tick	Rodents	Russia, China, Mongolia
	Oriental spotted fever	<i>R. japonica</i>	As above	Tick	Rodents	Japan
	Queensland tick typhus	<i>R. australis</i>	Fever, eschar, regional adenopathy, rash on extremities	Tick	Not defined	Australia, Tasmania
	Rickettsialpox	<i>R. akari</i>	Fever, eschar, adenopathy, disseminated vesicular rash	Mite	House mice	Russia, South Africa, Korea, Turkey, Balkan countries
	Rocky Mountain spotted fever, Sao Paulo exanthematic typhus, Minas Gerais exanthematic typhus, Brazilian spotted fever	<i>R. rickettsii</i>	Headache, fever, abdominal pain, macular rash progressing into papular or petechial (generally starting on extremities)	Tick	Rodents	Mexico, Central, and South America
	Tick-borne lymphadenopath (TIBOLA), Dermacentor- borne necrosis and lymphadenopath (DEBONEL)	<i>R. slovaca</i>	Necrosis erythema, cervical lymphadenopath and enlarged lymph nodes, rare maculopapular rash	Tick	Lagomorphs, rodents	Europe, Asia
	Unnamed rickettsiosis	<i>R. aeschlimannii</i>	Fever, eschar, maculopapular rash	Tick	Domestic and wild animals	Africa
Orientia	Scrub typhus	<i>Orientia tsutsugamushi</i>	Fever, headache, sweating, conjunctival injection, adenopathy, eschar, rash (starting on trunk), respiratory distress	Mite	Rodents	South, Central, Eastern, and Southeast Asia and Australia
Coxiella	Q fever	<i>Coxiella burnetii</i>	Fever, headache, chills, sweating, pneumonia, hepatitis, endocarditis	Most human infections are acquired by inhalation of infectious aerosols; tick	Goats, sheep, cattle, domestic cats, other	Worldwide
Bartonella	Cat-scratch disease	<i>Bartonella henselae</i>	Fever, adenopathy, neuroretinitis, encephalitis	Cat flea	Domestic cats	Worldwide
	Trench fever	<i>B. quintana</i>	Fever, headache, pain in shins, splenomegaly, disseminated rash	Human body louse	Humans	Worldwide
	Oroya fever	<i>B. bacilliformis</i>	Fever, headache, anemia, shifting joint and muscle pain, nodular dermal eruption	Sand fly	Unknown	Peru, Ecuador, Colombia
Ehrlichia	Ehrlichiosis	<i>Ehrlichia chaffeensis</i> ‡	Fever, headache, nausea, occasionally rash	Tick	Various large and small mammals, including deer and rodents	Worldwide

Anaplasma	Anaplasmosis	<i>Anaplasma phagocytophilum</i>	Fever, headache, nausea, occasionally rash	Tick	Small mammals, and rodents	Europe, Asia, Africa
Neorickettsia	Sennetsu fever	<i>Neorickettsia sennetsu</i>	Fever, chills, headache, sore throat, insomnia	Fish, fluke	Fish	Japan, Malaysia

\* This represents only a partial list of symptoms. Patients may have different symptoms or only a few of those listed.

‡ Includes 4 different subspecies that can be distinguished serologically and by PCR assay, and respectively are the etiologic agents of Boutonneuse fever and Mediterranean tick fever in Southern Europe and Africa (*R. conorii* subsp. *conorii*), Indian tick typhus in South Asia (*R. conorii* subsp. *indica*), Israeli tick typhus in Southern Europe and Middle East (*R. conorii* subsp. *israelensis*), and Astrakhan spotted fever in the North Caspian region of Russia (*R. conorii* subsp. *caspiæ*).

# Organisms antigenically related to these species are associated with ehrlichial diseases outside the continental United States.

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