Rocky Mountain Spotted Fever (RMSF)

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Etiologic Agent: *Rickettsia rickettsii* (7)

Transmission: Humans are infected with *Rickettsia rickettsii* through the bite of an infected. (1)

Reservoirs: Ticks. Some tick species known for carrying this disease are the American dog tick, the Rocky Mountain wood tick, and the brown dog tick. (1)

*Rickettsia rickettsii* characteristics: Gram-negative coccobacilli. 0.3-0.5 μm x 0.8-2.0 μm. Aerobic. Obligate intracellular parasite. (2)

Signs and Symptoms: Sudden onset fever, severe headache, fatigue, muscle pain, chills, and petechial rash. The first symptoms usually start 5-10 days after the tick bite. The rash typically begins to appear 2-5 days after the first symptoms and does not manifest as the typical rash of small, red spots until about a 7 days. Other, less common symptoms (listed least common to most common) include gangrene, seizures, coma, jaundice, ataxia, lethargy, or confusion. (3,5, 7) Due to the variance in the symptoms of this disease, it is often difficult to diagnose. Some patients never even develop the rash. (1)

Key Tests: Tests can only be definitive after the antibodies have developed. The tests that can be performed include agglutination, complement fixation, indirect immunofluorescence assay (IFA), EIA, Western blot, and NAT. (9) An infected patient’s immune system will produce antibodies against *R. rickettsii* and these can be tested for about a week after the beginning of the infection. The preferred test for these antibodies is the IFA. This test compares two samples of the patient’s serum to see if there was a large increase in IgG levels. The first sample should be taken as early into the illness as possible and the second should be taken 2-4 weeks later. (1)

Historical information: Boise, Idaho, 1896, *R. rickettsii* was first identified as a disease by Major Marshall H. Wood. The first medical case was reported in 1899 regarding an infected person from the Snake River Valley in Idaho. Then in 1902, in Bitterroot Valley, Montana, 7 people died from RMSF. *R. rickettsii* was named after Howard Ricketts. He studied RMSF and identified the etiologic agent and method of transmission in 1906. *R. rickettsii* was identified as an intracellular pathogen by S. Burt Wolbach in 1919. (7) The first test for RMSF was the Weil-Felix test and it was first available in 1921. (9)

Virulence Factors: *R. rickettsia* has a protein in its outer membrane called OmpA which aids in adherence, the first step in an infection. *R. rickettsia* appears to be able to cause a host cells to perform phagocytosis. This gets the organism into the host cell where it will avoid phagocytosis and move into the cytoplasm. *R. rickettsia* does not lyse the host cell but instead they emerge
from the host cell’s membrane. There is damage done to the host cell but it is not clear what exactly causes this damage. (11)

**Treatment:** The treatment used for RMSF depends on the severity of the case. Antibiotics that can be used include doxycycline, tetracycline, and chloramphenicol. If left untreated, this disease could be fatal. (6) If the infection is not caught early or if it is a more severe infection, the patient may require hospitalization and intravenous antibiotics. Because this disease is difficult to diagnose, doctors must use their best judgement and a patient’s recent history to assume that the patient actually has RMSF and they should be started on antibiotics. Doxycycline is the preferred antibiotic and should be started within the first five days after the symptoms have started. If a patient doesn’t respond to this antibiotic, they probably do not have RMSF. (1)

**Prevention:** If a person finds themselves in an area where ticks are known to live, they should wear clothes that cover as much of your skin as possible. Light colored clothing is also recommended. This will prevent the ticks from gaining access to you skin, which is obviously the best defense. Applying insect repellent containing DEET will repel tick and staying on paths rather than going through heavily wooded areas is a good way to avoid coming in contact with ticks. After coming back indoors for the day you should check your entire body for ticks, even if you have worn the aforementioned clothing. It is also a good idea to take a shower to wash any unattached ticks off your body. (4)

**Local Cases:** Cases have been reported in all states except for Vermont and Hawaii, but RMSF is most common in rural and suburban locations in the Southeast, western South Central, and parts of the Northeast regions of the United States. RMSF most commonly occurs in the summer months. The numbers of recorded cases have fluctuated greatly since 1920. For example, 2005 had 1,936 reported cases while 1998 had 365. (8) The number of cases reported each year has usually increased since 1993 to 2010. The peak was in 2008 with 2,553 cases. (12)

**Global Cases:** RMSF is only present in the Americas. (8) There is not much data regarding incidence outside of the United States though.

**Works Cited**


