



Rocky Mountain Spotted Fever

Rocky Mountain Spotted Fever (RMSF) is a disease caused by the bacteria *Rickettsia rickettsii*. The bacteria are transmitted to humans through the bite of an infected tick, most commonly the American dog tick (*Dermacentor variabilis*) or Rocky Mountain wood tick (*Dermacentor andersoni*). The disease was first recognized in the Rocky Mountain area, however, despite the disease's name, relatively few cases occur in the Rocky Mountain west. Most cases of RMSF occur in the Southeast and South central regions of the United States between the months of April and August, but in Arizona tick activity has been seen from March to September. RMSF used to be a rare disease in Arizona, however, it has become increasingly common over the last several years. Between 2003 and 2012, over 250 cases and 19 fatalities occurred in Arizona. Almost all of these cases occurred in areas with large amounts of free-roaming dogs and severe tick infestations, including six Tribal lands. During 2010-2011, RMSF in Arizona occurred at a rate ~200 times the national average. RMSF can be rapidly fatal if not treated within the first 5 days of symptom onset. Before tetracycline antibiotics were available, case fatality rates ranged from 20-80%.

Signs and Symptoms

Symptoms usually present in 2-14 days usually with a sudden onset of moderate to high fever, significant malaise, deep muscle pain, severe headache, chills and conjunctival infection. The "typical" triad of fever, rash, and tick bite are only presented between 21-40% of the time. Clinical signs and symptoms include:

- Fever, chills
- Severe headache
- Malaise
- Myalgia
- Gastrointestinal symptoms (nausea, vomiting, anorexia, abdominal pain, diarrhea, abdominal tenderness)
- Cough
- Conjunctival injection, ± photophobia
- Altered mental status
- Focal neurologic deficits, including cranial or peripheral motor nerve paralysis or sudden transient deafness.

Maculopapular Rash

- Typically appears 2-5 days after the onset of fever.
- Small, flat, pink, non-itchy spots (macules) initially appear on the wrists, forearms, and ankles then spread to the trunk and sometimes palms and soles.
- Rash may not develop until late in the disease process, after treatment should have already begun. Approximately 10% of RMSF patients never develop a rash at all.
- Consider RMSF if other signs and symptoms support a diagnosis, even if a rash is not present.



Petechial Rash

- Red to purple spots (petechiae) are usually not seen until day 6 or later after onset of symptoms.
- Petechial rash is considered a sign of progression to severe disease. Every attempt should be made to begin treatment before petechiae develop.

Diagnosis

Confirmation of the diagnosis is based on laboratory testing, but antibiotic therapy should not be delayed in a patient with suggestive clinical presentation. Antibiotics are less likely to prevent fatal outcome from RMSF if started after day 5 of symptoms.

Antibodies to *R. rickettsii* are detectable 7–10 days after illness onset. The gold-standard serologic test looks for a four-fold change in antibody titers using immunofluorescence assay (IFA) on paired samples. The first sample should be taken within the first week of illness and the second should be taken 2–4 weeks later.

- Demonstration of a four-fold change in IgG-specific antibody titer by immunofluorescence assay (IFA) test in paired serum samples.
- Detection of DNA in a skin biopsy of rash by polymerase chain reaction (PCR) assay (generally unreliable for acute blood samples).
- Immunohistochemical (IHC) staining of organism.

NOTE: IgM antibodies are less specific than IgG antibodies and are more likely to generate false positives. IgM results alone should not be used for laboratory diagnosis.

NOTE: Antibody titers are frequently negative in the first 7–10 days of illness, thus serologic tests may be falsely negative during this time period. For accurate testing of suspect cases an acute and convalescent serum are necessary.

Common laboratory findings suggestive of RMSF include: thrombocytopenia (reduced platelet count), hyponatremia (reduced sodium levels), and elevated liver enzyme levels.

Treatment

Doxycycline is the first line treatment for adults and children of all ages and should be initiated immediately whenever RMSF is suspected. Use of antibiotics other than doxycycline is associated with a higher risk of fatal outcome. Treatment is most effective at preventing death if doxycycline is started in the first 5 days of symptoms. Therefore, treatment must be based on clinical suspicion alone and should always begin before laboratory results return or symptoms of severe disease, such as petechiae, develop.



In Maricopa County

Although RMSF is not present in Maricopa County, there are still cases in residents who have traveled to endemic areas (both within and outside of the state) or moved from an endemic area. From 2006-2011 there were 56 cases investigated within Maricopa County. Of those investigated, one patient was a suspect case, four patients were probable cases, and one patient was confirmed for RMSF.

Prevention

Reducing exposure to ticks is the best defense against RMSF and other tick-borne infections. There are several approaches you and your family can use to prevent and control RMSF:

- Use insect repellants containing from 10% to 35 % DEET when camping and hiking.
 - Wear light-colored long pants and long sleeved clothing so that ticks are easier to spot before they attach to the skin.
 - Remove ticks promptly, since attachment of more than 24 hours is required for disease transmission.
 - Avoid overgrown brush by walking in the center of the trail, and remove brush from personal residences.
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Resources

- [Centers for Disease Control and Prevention](http://www.cdc.gov/rmsf/) (CDC) RMSF webpage: <http://www.cdc.gov/rmsf/>
- [Arizona Department of Health Services](http://www.azdhs.gov/phs/oids/vector/rmsf/) (ADHS) RMSF webpage: <http://www.azdhs.gov/phs/oids/vector/rmsf/>
- [Arizona Department of Health Services 2013 Case Definitions](http://www.azdhs.gov/phs/oids/pdf/casedefinitions.pdf) (ADHS) 2013 Case Definitions: www.azdhs.gov/phs/oids/pdf/casedefinitions.pdf
- [Tick-Borne Diseases of the United States](http://www.cdc.gov/lyme/resources/TickborneDiseases.pdf) (CDC) A reference manual for health care providers: <http://www.cdc.gov/lyme/resources/TickborneDiseases.pdf>
- [Tick removal](http://www.cdc.gov/ticks/removing_a_tick.html) (CDC) A reference manual for properly removing ticks: http://www.cdc.gov/ticks/removing_a_tick.html