CONDITION

Rocky mountain spotted fever

Rocky Mountain spotted fever is a serious bacterial infection spread through the bite of an infected tick.

WHAT IT IS
Serious tick-borne bacterial infection

BODY SYSTEM
Blood vessels, skin, brain, lungs, and kidneys

MAIN SYMPTOMS
Fever, severe headache, muscle pain, rash

WHAT CAUSES IT
Rickettsia rickettsii infection from an infected tick

HOW IT IS DIAGNOSED
Paired antibody tests, PCR, or skin biopsy

MAIN TREATMENT
Prompt treatment with a tetracycline antibiotic

CAN IT BE CURED?
Yes, antibiotics can clear the infection

IS IT AN EMERGENCY?
Yes, suspected infection needs immediate treatment

LONG-TERM OUTLOOK
Usually full recovery when treated early

Overview

Rocky Mountain spotted fever, often shortened to RMSF, is an infection caused by the bacterium Rickettsia rickettsii . People usually get it through the bite of an infected tick.

Despite its name, RMSF is not limited to the Rocky Mountains. It occurs in several parts of the United States and in parts of Central and South America. Different tick species can spread it in different regions.

The bacteria attack cells lining small blood vessels. This causes inflammation and leakage from the vessels, which can affect the skin, brain, lungs, kidneys, heart, and other organs.

RMSF matters because it can become severe quickly. Early symptoms may resemble flu, a stomach infection, or another common illness. The well-known spotted rash may appear later,

and some people never develop it.

Treatment should begin as soon as RMSF is suspected. Waiting for a rash or a positive blood test can allow the infection to worsen. With early antibiotic treatment, most people recover.

Symptoms

Symptoms usually begin several days after an infected tick bite. However, many people do not remember being bitten. Ticks can be small, and their bites are often painless.

Early symptoms may include:

A rash often develops after the fever begins, but it may not be present during the first few days. It commonly starts as small, flat, pink spots around the wrists and ankles. It may then spread toward the trunk and sometimes to the palms of the hands and soles of the feet.

Later in the illness, the rash may become red or purple and look like tiny areas of bleeding under the skin. This is called a petechial rash. It can be a sign of more advanced blood vessel injury and needs urgent assessment.

Not everyone develops the typical rash. Its appearance may also be harder to recognize on brown or black skin. Changes may be easier to see in lighter areas, such as the palms, soles, inside the eyelids, or mouth. A healthcare professional should not rule out RMSF only because no rash is visible.

Children may be more likely to have abdominal symptoms, which can sometimes resemble appendicitis or a stomach infection. Severe illness at any age may cause confusion, breathing problems, seizures, or reduced urine production.

- Sudden fever
- Severe headache
- Muscle aches
- Tiredness or weakness
- Nausea, vomiting, or loss of appetite
- Abdominal pain
- Red or irritated eyes

Causes and risk factors

RMSF is caused by Rickettsia rickettsii . A tick becomes infected after feeding on an infected

animal. It can then pass the bacteria to a person while attached and feeding.

Ticks linked to RMSF include the American dog tick, Rocky Mountain wood tick, and brown dog tick. The species involved depends on where you live or travel.

You may have a greater chance of exposure if you:

Cases are more common during months when ticks are active, but infection can occur at other times. Local climate and tick species affect the season.

RMSF does not normally spread from one person to another. You cannot catch it through routine contact, coughing, sharing food, or touching the rash.

Removing an attached tick promptly may lower the chance of infection. However, finding a tick does not mean it was infected, and not remembering a tick bite does not rule RMSF out.

- Spend time in wooded, grassy, or brush-filled areas
- Work or take part in outdoor activities
- Live with dogs that may carry ticks indoors or into yards
- Do not use tick protection or check for ticks after being outdoors
- Live in or visit an area where RMSF occurs

Diagnosis

RMSF is often diagnosed from the pattern of symptoms, the possibility of tick exposure, and local tick activity. This is known as a clinical diagnosis.

Blood antibody testing can help confirm the infection. Antibodies are proteins made by the immune system in response to infection. During the first week, an antibody test is often negative because the body has not yet produced enough antibodies to measure.

For this reason, confirmation usually requires two blood samples: one taken early and another taken several weeks later. A rise in antibody levels supports the diagnosis. A single positive test may reflect an older infection and does not always prove that current symptoms are due to RMSF.

A PCR test looks for genetic material from the bacteria. PCR may be performed on a skin biopsy from a rash or, in some cases, on blood. A skin biopsy removes a very small sample of skin for testing. A negative PCR result does not always exclude RMSF.

Other blood tests may show a low platelet count, low sodium, or signs of liver irritation, but these findings are not specific to RMSF.

Because early tests can be negative, treatment should not be delayed while waiting for

confirmation when the condition is suspected.

Treatment and management

Doxycycline, a tetracycline antibiotic, is the recommended treatment for RMSF. It is used for adults and children of all ages because delayed or less effective treatment carries a much greater risk than the brief antibiotic course used for this infection.

Treatment works best when started during the first few days of illness. A healthcare professional may begin treatment based on symptoms and possible tick exposure, even if there is no rash and test results are not yet available.

The length of treatment is based on your fever, improvement, and clinical findings. It is important to complete the prescribed course, even if you begin to feel better.

People with mild illness may sometimes be treated at home with close follow-up. Hospital care may be needed if there is vomiting that prevents medicines from staying down, severe weakness, confusion, breathing difficulty, low blood pressure, kidney problems, or other signs of organ involvement. Antibiotics like amoxicillin or doxycycline can then be given through a vein, along with fluids and other supportive care.

Preventive antibiotics are not routinely recommended for someone who feels well after a tick bite. Instead, watch for fever, headache, rash, or other symptoms during the following days and seek prompt medical advice if they develop.

Complications

RMSF damages small blood vessels. Without early treatment, this can reduce blood flow or cause fluid to leak into tissues.

Possible complications include:

Severe complications are more likely when treatment is delayed. They may also be more likely in older adults, people with certain long-term health conditions, and people with weakened immune systems.

RMSF can be fatal, but prompt treatment greatly reduces that risk. The absence of a rash should never be used as a reason to delay assessment when other symptoms and tick exposure suggest the infection.

- Inflammation of the brain, called encephalitis

- Confusion, seizures, or problems with balance and coordination
- Lung inflammation and breathing failure
- Kidney injury
- Low blood pressure or shock
- Abnormal bleeding or clotting
- Damage to fingers, toes, or other tissues from poor blood flow
- Hearing loss or lasting nerve problems

Prevention

There is no vaccine for RMSF. Prevention focuses on avoiding tick bites and removing attached ticks promptly.

When spending time where ticks may live:

Check warm or hidden areas carefully, including the scalp, behind the ears, under the arms, around the waist, behind the knees, between the legs, and around the ankles.

To remove a tick, use clean, fine-tipped tweezers. Grasp it close to the skin and pull upward with steady pressure. Do not twist, crush, burn, or cover it with petroleum jelly. Clean the bite area and your hands afterward.

You do not need to keep every tick. If you do keep it for identification, place it in a sealed container. Testing a tick for bacteria is not usually useful for deciding whether you need treatment, because a positive tick test does not prove transmission and a negative result may be misleading.

- Use an Environmental Protection Agency-registered tick repellent as directed
- Treat clothing and outdoor gear with products containing permethrin, or buy pretreated items
- Walk near the centre of trails and avoid brushing against tall grass
- Check your clothing, equipment, pets, and skin after being outdoors
- Shower soon after returning indoors, which can help you find unattached ticks
- Dry outdoor clothing on high heat when the fabric instructions allow

Living with it and what to expect

When RMSF is treated early, fever and other symptoms often begin improving after antibiotics are started. Recovery may still take time. Headache, tiredness, and reduced stamina can continue while your body recovers.

RMSF is an acute infection, meaning it develops over a short period rather than becoming a lifelong infection. After an effective course of treatment, the bacteria are not expected to remain active or cause repeated episodes.

People who had severe illness may need longer recovery. Blood vessel, brain, kidney, lung, or tissue damage can leave lasting effects. These may include weakness, hearing changes, problems with concentration or coordination, or loss of damaged tissue. Rehabilitation, hearing care, or specialist follow-up may be needed.

Routine follow-up may include reviewing whether symptoms are improving and checking any organ problems found during the illness. Contact your healthcare professional if fever returns, symptoms worsen, you cannot take the antibiotic, or recovery is not progressing as expected.

Having RMSF once does not remove the need for future tick protection. You can still be bitten by ticks carrying RMSF or other infections.

When to get medical help

Seek same-day medical care if you develop fever, severe headache, muscle pain, vomiting, or a new rash after a possible tick bite or time in a tick habitat. Mention where you have recently lived or travelled and when symptoms began.

Do not wait for a spotted rash. Do not wait for a tick test or early blood test before seeking care. If RMSF is suspected, prompt treatment is important.

Get emergency help now if you have:

These symptoms can indicate advanced infection or another urgent condition. They need emergency assessment.

- Trouble breathing
- New confusion, extreme drowsiness, or difficulty waking
- A seizure
- Fainting or signs of very low blood pressure
- Severe weakness or inability to stand
- A rapidly spreading red, purple, or bruise-like rash

- Very little urine or other signs of serious illness

Common questions

Can I have Rocky Mountain spotted fever without a rash?

Yes. The rash may appear several days after other symptoms begin, and some people never develop one. Treatment should not wait for a rash when the infection is suspected.

Does every tick bite cause RMSF?

No. Most tick bites do not cause RMSF. The tick must be an infected species and transmit the bacteria while feeding. Even so, seek medical advice promptly if fever or other symptoms develop after possible exposure.

Will a blood test show RMSF right away?

Often not. Antibody tests are commonly negative during the first week. A second sample several weeks later may be needed for confirmation. This is why early treatment is based mainly on symptoms and exposure risk.

Is Rocky Mountain spotted fever contagious?

No. It does not normally pass between people through ordinary contact. Infection usually comes from the bite of an infected tick.

Can children take doxycycline for RMSF?

Yes. Doxycycline is the recommended treatment for suspected RMSF in children of all ages. A short treatment course has not been shown to stain permanent teeth.

Can RMSF come back after treatment?

A relapse is not expected after effective treatment. Some people remain tired or have lasting effects from organ or tissue injury, but this does not usually mean the infection is still active.

Sources

- Centers for Disease Control and Prevention. About Rocky Mountain Spotted Fever
- Centers for Disease Control and Prevention. Clinical Signs and Symptoms of Rocky Mountain Spotted Fever
- Centers for Disease Control and Prevention. Clinical and Laboratory Diagnosis for Rocky Mountain Spotted Fever

- Centers for Disease Control and Prevention. Clinical Care of Rocky Mountain Spotted Fever
- Biggs HM, Behravesh CB, Bradley KK, et al. Diagnosis and Management of Tickborne Rickettsial Diseases in the United States. CDC MMWR Recommendations and Reports. 2016;65(2):1-44