CD Summary
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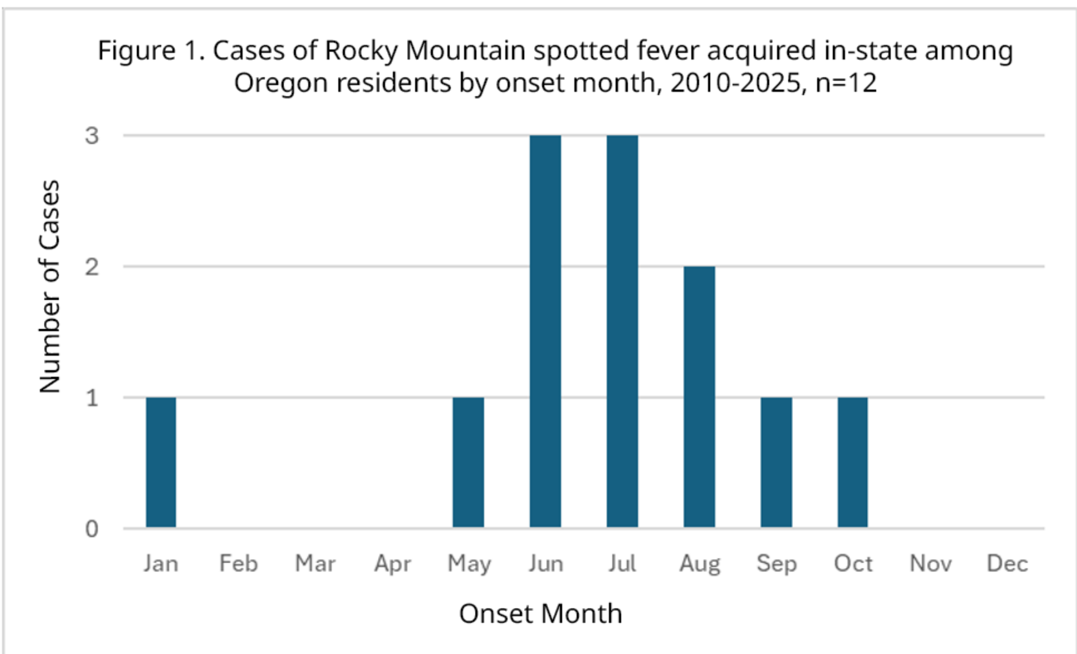
Spotted Fever Group Rickettsioses (SFGR) of Oregon

"...if they have a bacterial tickborne disease, they likely have doxycycline deficiency syndrome..." – Anonymous infectious disease doctor



Introduction

Last year, we focused a *CD Summary* on the elusive tickborne diseases typically associated with the east side of Oregon's Cascades— Colorado tick fever and soft tick relapsing fever.[†] This year, we're highlighting Oregon's spotted fever group rickettsioses (SFGR), which can be acquired on either side of the Cascades in at least four tick species in Oregon, and other ticks found elsewhere in the US and other countries.

SFGR are a family of febrile, rash-associated diseases caused by various intracellular Rickettsia bacteria. Early signs appearing 3 to 12 days after the initial tick bite typically include non-specific symptoms of fever, headache, myalgias, and nausea.[1]

Rocky Mountain spotted fever (RMSF), caused by *Rickettsia rickettsii*, was first described in the western United States in the early 20th Century and is the most severe of all tickborne SFGR.[‡] Because these symptoms mimic many other conditions, early diagnosis can be challenging.[1] Despite the "spotted fever" in the name, the rash is highly variable and often absent when patients first seek care.

Simultaneously, RMSF can be rapidly fatal if not treated within the first five days of symptoms.[§] Before tetracycline antibiotics were available, case fatality rates ranged from 20 to 80%. In situations where SFGR is a possibility due to exposure history or history of a tick-bite in a spotted fever endemic area, treatment should be initiated based on a presumptive diagnosis, and not be delayed while awaiting a rash to appear or laboratory confirmation, nor discontinued based on initial negative serology or PCR results.[1] Doxycycline is the standard treatment of choice unless contraindicated.[1]

The good news (so far) is that all tickborne diseases acquired in Oregon are rare—each tickborne disease, including SFGR, has an incidence rate of approximately 1–2 cases per million population per year. Between 2010–2025, Oregon's annual incidence rate of SFGR was 0.7 cases per million population per year (37 cases). Only 12 of these cases (32%) were acquired in-state, yielding an incidence rate of 0.2 cases per million population per year, or about one case annually.

Background

Since RMSF was first described in Oregon in the early 1900s, wide geographical variations in RMSF severity intrigued investigators

[†] https://www.oregon.gov/oha/ph/diseasesconditions/communicabledisease/cdsummarynewsletter/documents/ohd7402.pdf

[‡] https://www.niaid.nih.gov/diseases-conditions/rocky-mountain-spotted-fever

[§] https://www.cdc.gov/rocky-mountain-spotted-fever/hcp/signs-symptoms/index.html

who observed milder presentations in Oregon and other western states, including lower fever and less case-fatality compared to classic RMSF elsewhere.[2-4]

Until 2004, RMSF was considered the only tickborne SFGR in the US. The identification of *Rickettsia parkeri* that year was followed by the discovery of *Rickettsia rickettsii* subsp *californica*, the etiologic agent of Pacific Coast tick fever (endemic in Oregon despite no documented cases to date), and most recently *Rickettsia lanei*.[5-7]

Of the 37 SFGR cases reported among Oregon residents from 2010–2025, 12 cases (32%) were acquired in Oregon, 15 (41%) from other US states, and 11 (30%) were exposed outside the US. Of the international exposures, 10 (91%) were African tick bite fever acquired in southern Africa; the remaining case was infected with *Rickettsia honei* and exposed in India near the Himalayas.[8]

Table 1. Number and percentages of clinical symptoms and various attributes associated with Oregon-acquired Rocky Mountain Spotted Fever Cases (n=11) and one Oregon-acquired *Rickettsia lanei* case (2010-2025).

Clinical symptom or other attribute	Rickettsia rickettsii (RMSF) n=11 (number, %)	*Rickettsia lanei* n=1
Fever	11 (100%)	Present
Myalgia	10 (91%)	Present
Headache	9 (82%)	Present
Elevated aminotransferase levels	6 (55%)	Present
Rash	6 (55%)	Present
Gastrointestinal abnormalities (nausea, vomiting, abdominal pain)	6 (55%)	Absent
Thrombocytopenia	4 (36%)	Absent
Leukopenia	3 (27%)	Absent
Altered mental status, coma, cerebral edema	1 (9%)	Present
Respiratory compromise (pulmonary edema, acute respiratory distress syndrome)	1 (9%)	Absent
Skin and soft tissue necrosis which can result in amputations or skin grafts	0	Absent
Multiorgan system damage (CNS, renal failure)	0	Absent
Hospitalized	7 (63%)	Yes
Median days hospitalized (range)	3 (0-10)	3
Intensive Care	1 (9%)	Yes
Fatal outcome	None	No
Paired sera collected	5 (45%)	Yes
Acute sera collected within 14 days of onset	8 (73%)	Yes
Convalescent sera collected 2-4 weeks after acute	2 (18%)	Yes
Confirmed Cases with 4-fold rise in titer	3 (27%)	Yes

Diagnostic Testing

Presumptive diagnoses are based on clinical symptoms and epidemiological risk factors, and antibiotic treatment should be initiated prior to diagnostic testing. Diagnostic options include serology, which requires paired sera with acute samples collected within 14 days of illness onset and convalescent samples 2–4 weeks afterwards.[1] PCR testing of blood or testing specimens is also available, but performance varies widely by individual test and negative results do not necessarily exclude disease. PCR testing of eschar swabs is also available at the CDC, which is useful for eschar-producing SFGR, such as *R. parkeri*, *Rickettsia rickettsii* subsp *californica*, and *R. africae* (African tick bite fever).[10] **Metagenomic sequencing of microbial-cell-free DNA has also become commercially available and helped identify Oregon's first case of R. lanei, although sensitivity and specificity of these techniques remain unknown.[9]

Oregon-acquired SFGR cases (2010-2025, n=12)

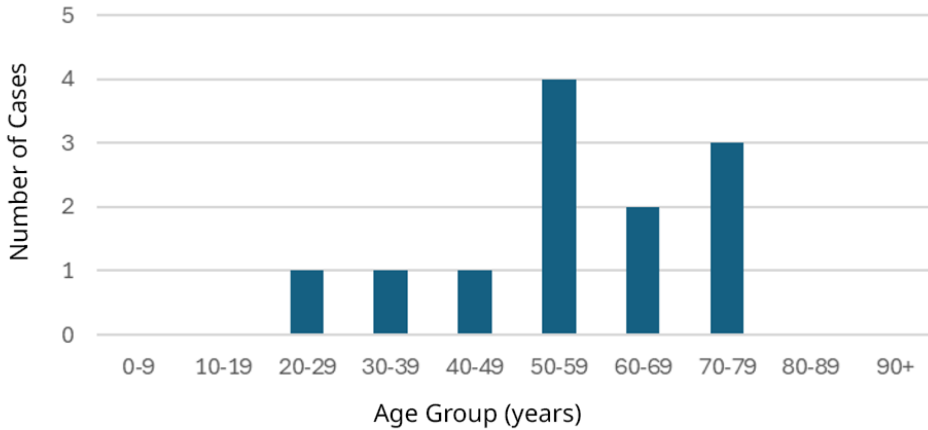
Among Oregon's 11 RMSF cases and the one R. lanei case (initially diagnosed as RMSF), all presented with fever, and the vast majority had accompanying headache and myalgia (Table 1). The median age was 54 years (range: 1–68), half were female, and 92% of case onsets were between May and October (Figures 1 and 2).

Eight cases (67%) were acquired east of the Cascades, including Crook County (n=5), Grant County (n=2), and Deschutes County (n=1), while three (25%) cases were exposed in Josephine County and one (8%) in Clackamas County (Figure 3). Among nine cases with available exposure data, four (44%) had been camping in Crook or Grant counties, three were performing ranch work in Crook County, and two were exposed while hiking in Clackamas County or gardening in Josephine County.

Discussion

SFGR infections are uncommon in

**https://www.cdc.gov/vector-borne-diseases/media/pdfs/2024/06/FS_Collection-Submission-Eschar-Swab-Specimens-Rickettsial-Disease-508.pdf



Oregon, with approximately one or two cases identified annually, and additional infections are likely going undetected. When evaluating patients, obtaining a comprehensive exposure history is essential, including any evidence of tick bites or observed tick activity. The team at Oregon Health Authority is available for consultation whenever a tickborne illness is being considered.

One case initially diagnosed as RMSF was later found to be infected with *R. lanei*, representing the third known human case and first documented in Oregon. Data remain extremely limited regarding the clinical spectrum of illness for *R. lanei*.[9]

Notably, two earlier RMSF cases reported exposures within 8 miles of the R. lanei case several years prior. One of these patients experienced mild symptoms not requiring hospitalization. However, the other case presented with altered mental status, blanching rash, and a fairly quick recovery despite an 11-day delay in administration of doxycycline—a similar clinical course to Oregon's *R. lanei* case. Both of these cases were likely exposed to rabbit ticks (*Haemaphysalis leporispalustris* or *H. vespertina*), which are suspected vectors of *R. lanei.*[11]

These findings raise the intriguing possibility that Oregon's previously reported RMSF cases might have been identified as *R. lanei* if molecular laboratory techniques were available at the time. Regardless, these cases underscore the importance of strong clinical, epidemiologic, and laboratory partnerships in identifying novel tickborne pathogens.

We thank our collaborators for engaging public health when patients are encountered with potential tickborne diseases. Diseases associated with the Western black-legged tick, Ixodes pacificus, are planned as the focus of a future issue on tickborne diseases.

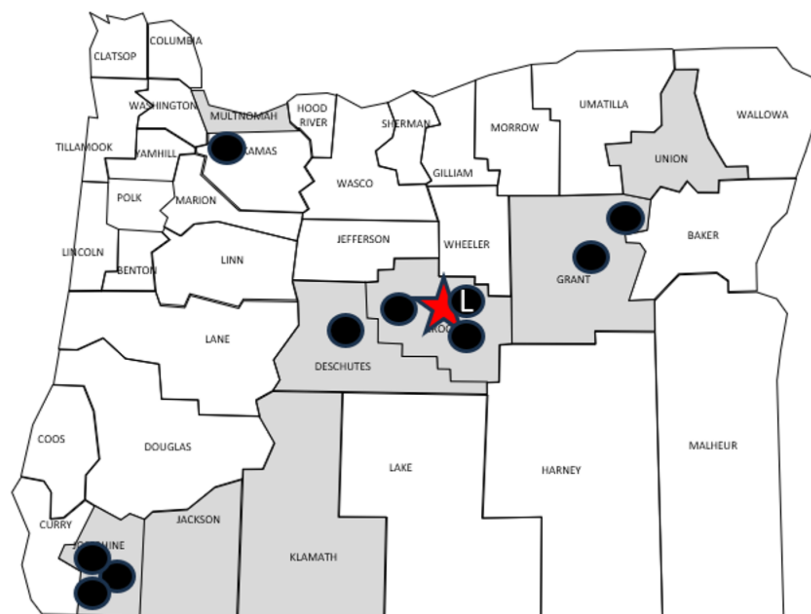
Tick identification and testing

Although clinical decisions should never be based on tick testing, please contact us if you would like to have a tick identified or tested. We will need the collection date and the location where it was collected.

Bottom line

Please call your local public health authority (see www.healthoregon.org/lhddirectory), or Oregon Health Authority (OHA) Acute and

Figure 3. Rocky Mountain Spotted Fever cases and a *Rickettsia lanei* case, including one cluster (defined as >1 person) indicated by the Red Star, by Exposure area and County of Residence (shaded) 2010-2025, Oregon, n=12.



Communicable Disease Prevention at 971-673-1111 for testing guidance.

How to Report

Consider using our on-line reporting page to report any reportable disease: healthoregon.org/onlinemorbidityform.

For more information

Oregon Health Authority tick webpage: www.oregon.gov/ticks

General Disease Reporting: healthoregon.org/diseasereporting

Preventing tick exposures

Reducing tick exposures is the best defense against tickborne diseases.††

-**Know where to expect ticks.** Avoid wooded and brushy areas with high grass and leaf litter. Walk in the center of trails.

-**Treat clothing and gear with products containing 0.5% permethrin.** Permethrin remains effective through several washings.

-**Use tick-prevention products for pets.** Check pets for ticks daily.

-**Apply sunscreen first and insect repellent second.** Use Environmental Protection Agency (EPA)-registered insect repellents containing DEET, picaridin, IR3535, Oil of Lemon Eucalyptus (OLE), para-menthane-diol (PMD), or 2-undecanone. When used as directed, repellents are safe and effective, including for pregnant and breastfeeding individuals.

-**Shower soon after spending time outdoors.** Check yourself, pets and gear for ticks.

Citations

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†† https://www.cdc.gov/ticks/prevention/index.html