Tularemia

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CAUSE

Tularemia is caused by the bacterium *Francisella tularensis*. There are two types of this bacteria: Type A (*F. t.* biovar *tularensis*), which has a terrestrial transmission cycle, and Type B (*F. t.* biovar *holarctica*), which has an aquatic transmission cycle.

DISEASE SIGNIFICANCE

Tularemia causes sporadic, regional mortality in wild lagomorphs (e.g. rabbits and hares) and rodents. Specifically, it has been documented to produce localized morality in cottontail rabbits and to a lesser extent gray squirrels in the eastern U.S. Die-offs of these species should prompt tularemia as a potential cause. In the western United States, mortalities are reported in jackrabbits. In Canada and the northern United States, mortalities are reported in beavers and muskrats.

HOST SPECIES

Francisella tularensis has been detected in over 100 species of mammals, but disease most commonly occurs in wild rabbits and rodents. Rarely, some species of fish, birds, and amphibians can be infected. The terrestrial cycle (Type A) typically involves wild rabbits and terrestrial rodents (e.g. squirrels). Muskrats and beavers are the primary hosts for the aquatic cycle (Type B) of this disease.

GEOGRAPHICAL DISTRIBUTION

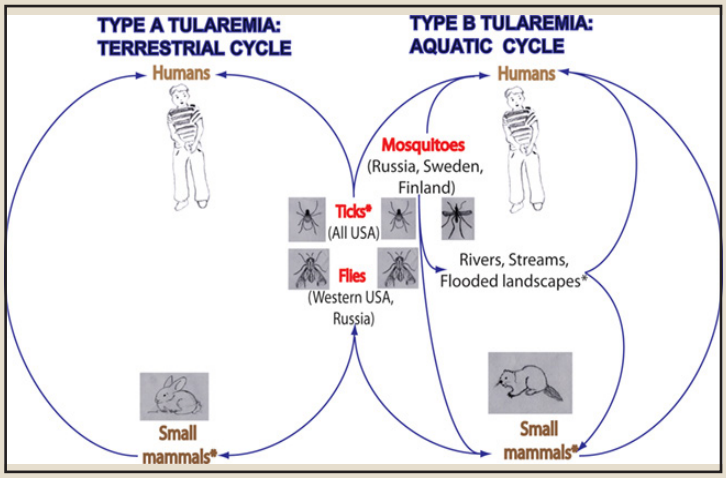
Tularemia has been reported in Canada, Mexico, and in all US states except Hawaii. It has been reported in the northern US and Canada in muskrats and beavers, but has not been reported in either of these species in the southeastern US. Cases in cottontail rabbits occur throughout the US and cases in jackrabbits occur in the western US. Although tularemia can occur throughout the Southeast, reports of disease are most common in Arkansas, Missouri, and Oklahoma and adjacent parts of the Midwest (e.g., Kansas, Nebraska). Cottontail rabbits and tree squirrels are most commonly affected in these areas.

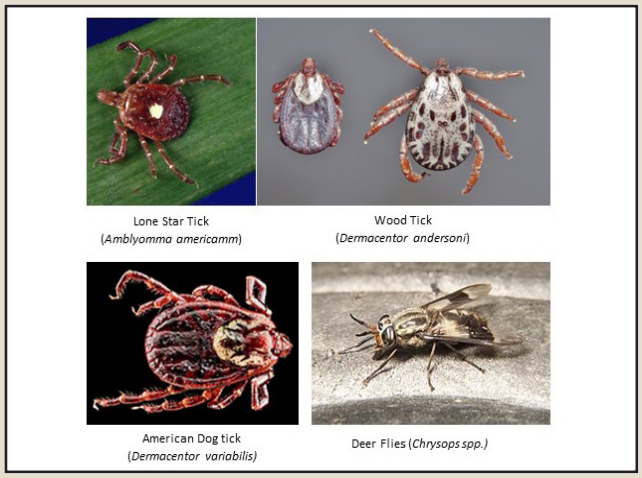
TRANSMISSION

Francisella tularensis can be present in many host tissues and is also stable for short periods of time in the environment under certain conditions. In wildlife, the terrestrial cycle of tularemia (Type A) primarily involves transmission by blood-feeding arthropods (e.g. fleas, ticks, mosquitoes, and flies), while waterborne transmission is the primary method in the aquatic cycle (Type B). Wild predator species are commonly infected through consuption of infected prey. *Francisella tularensis* can be transmitted to people by blood-feeding arthropods, through contact with contaminated tissues or water, through a break in the skin, through inhalation, or via ingestion of contaminated, undercooked meat.

FIELD SIGNS

Disease occurs rapidly in cottontails and infected animals are often found dead. Prior to death, signs may include lethargy, incoordination, and dull mentation. Signs of liver disease could also be present such as jaundice (yellow coloration of skin, eyes, and mucous membranes). Infected animals that experience disease symptoms may look generally sickly and have fur that appears unkempt.





Left: The terrestrial and aquatic cycles of *Francisella tularensis* transmission. From Akimana and Kwaik, 2011. **Right**: Vectors of *Francisella tularensis*. Photos from Wikimedia Commons, photo credit: James Gathany (lone star tick), Daktaridudu (*Dermacentor andersoni*), Sam Droege (American dog tick), Bruce Marlin (*Chrysops callidus*).

RISK TO HUMANS & DOMESTIC ANIMALS

Francisella tularensis is transmissible to people and causes life-threatening illness that includes fever, infected sores at the entry wound, swollen lymph nodes, and general flu-like symptoms that progress to severe systemic disease. Anyone who becomes sick after known or suspected exposure should seek medical attention. If treated with appropriate antibiotics, few cases are fatal. Cat bites and scratches can transmit the bacteria to people. Domestic animals are usually considered accidental hosts, but outbreaks with high mortality have occurred in sheep in North America and Russia. Outbreaks have also been reported in commercially bred mink, beaver, and fox. Tularemia is uncommon in domestic dogs and cats, but manifests as severe, systemic disease. Compared to cats, dogs are more resistant and have more subtle clinical signs.

PREVENTION & MANAGEMENT

People can avoid contracting tularemia by using insect repellent, wearing gloves when handling sick or dead animals, and avoiding mowing over dead animals. Tick control is an important method for preventing the spread of the bacteria.

REFERENCES

Centers for Disease Control and Prevention: https://www.cdc.gov/tularemia/index.html

American Veterinary Medical Association: https://www.avma.org/tularemia-facts

Akimana C and Kwaik YA. 2011. Francisella-arthropod vector interaction and its role in patho-adapatation to infect mammals. Frontiers in Microbiology. 2: 34. https://doi.org/10.3389/fmicb.2011.00034

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