



**Research:** Development of a Nonhuman Primate Model of Pulmonary Tularemia for Use in Testing Tularemia Vaccines

**Lead Scientist(s):** Robert Sherwood, PhD

**Disease/Condition:** Tularemia

Tularemia is an infectious disease caused by a bacterium, *Francisella tularensis*, that is commonly found in Northwestern America. It is normally spread by deer flies, mosquitoes, or ticks, and animals commonly infected are rabbits and deer. Humans may be unintentionally infected, often as a result of skinning an infected animal after a hunt. Humans can also contract a disease sometimes called "Rabbit Fever" or "Deer Fly Fever". Tularemia is highly infective and causes a protracted disease in humans characterized by sudden onset of chills, fever, headache, muscle aches, fatigue, and loss of bodily fluids (similar to typhoid). It can also cause skin infections with deep ulcers and swelling of regional lymph nodes as well as weight loss and prostration. In some cases it may result in death. Unfortunately, this microbe may also be used a bioterrorism agent.

Researchers at Lovelace Respiratory Research Institute have been characterizing the disease in nonhuman primates (NHPs) that develops after pulmonary infection. This is the most dangerous type of tularemia and the most difficult form of the disease to protect against with a vaccine. In recent studies conducted with 30 NHPs, anesthetized animals were infected via aerosol with decreasing doses of tularemia. NHPs received doses varying from 1 million down to 1 viable bacterium. Those that received a high infectious dose succumbed to disease in 2-3 days, while animals infected with lower doses had longer survival times. One animal survived until the end of the study. Tularemia in NHPs was characterized by lethargy, weight loss, and malaise. Increased respiration rates were observed in animals with pneumonia. High numbers of bacteria were found in lungs and lymph nodes of infected animals, with significant numbers of bacteria disseminated throughout the body. The 50% lethal dose of this bacterium when administered via aerosol to NHPs was determined to be 1-2 viable bacteria. This information is being used to further characterize the NHP model of tularemia for the testing of new vaccines being developed to prevent this terrible disease.