

# Francisella tularensis: Stopping a biological weapon

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Scientists hope a vaccine is on the horizon for tularemia, a fatal disease caused by the pathogen *Francisella tularensis*, an organism of concern as a potential biological warfare agent. Until recently we knew very little about this bacterium. However, according to the August issue of the *Journal of Medical Microbiology*, research on the bacterium has been reinvigorated and rapid progress has been made in understanding how it causes disease.

Infection with *F. tularensis* can result in a variety of symptoms, depending on the route of infection. For example, infection via an insect bite can lead to a swollen ulcer or fever, chills, malaise, headaches and a sore throat. When infection occurs by eating contaminated food, symptoms can range from mild diarrhoea to an acute fatal disease. If inhaled, *F. tularensis* infections can have a 30% mortality rate if left untreated.

"Only very few bacteria are needed to cause serious disease," said Prof Petra Oyston from Dstl, Porton Down. "Because of this and the fact that tularemia can be contracted by inhalation, *Francisella tularensis* has been designated a potential biological weapon. Since the events of September 2001 and the subsequent anthrax attacks on the USA, concern about the potential misuse of dangerous pathogens including *F. tularensis* has increased. As a result, more funding has been made available for research on these organisms and has accelerated progress on developing medical countermeasures."

Tularemia circulates in rodents and animals like rabbits and hares. Outbreaks in humans often happen at the same time as outbreaks in these animals. The disease is probably transmitted by insects like mosquitoes, ticks and deer flies. People can also become infected by contact with contaminated food or water and by breathing in particles containing the bacteria. Farmers, hunters, walkers and forest workers are most at risk of contracting tularemia.

There is currently no vaccine against tularemia. Because there are few natural cases of tularemia, money was not spent on the development of a vaccine. However, various nations developed *F. tularensis* as a biological weapon, including the reported production of antibiotic-resistant strains, so research into its pathogenesis has become a biodefence issue.

"Progress is being made," said Prof. Oyston. "Since the genome of *F. tularensis* was sequenced, researchers have taken great strides in understanding the molecular basis for its pathogenesis. This is essential information for developing a vaccine and getting it licensed."

We are still unsure about the function of most *F. tularensis* genes. "Recently genes needed by *F. tularensis* for growth and survival have been identified," said Prof. Oyston. "These could be targets for novel antimicrobial development or could be used in the production of a vaccine."

"Although we are getting closer to addressing key issues such as the need for an effective vaccine, it appears we are still some way from understanding the pathogenesis of *F. tularensis*. More research is needed in this area."

Source: Society for General Microbiology

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