



# Tularaemia

**Pathogen:** *Francisella tularensis*

## Occurrence

Tularaemia is an infectious disease which is caused by the bacterium *Francisella tularensis* and can be characterised by a wide range of symptoms. It is a naturally occurring disease in wild mammals (in particular mice, rats and rabbits). This highly infectious pathogen is transmitted by blood-sucking insects (gnats and ticks) or through direct contact with infected animals. It can survive for a long time (at least 3 months) in the environment (soil, water). There are two main recognised types of pathogens: Type A is the more virulent (morbid) variant and occurs primarily in North America. Type B is the less serious variant and can be found throughout the entire Northern hemisphere, especially Scandinavia, the Balkans and Russia.

## Identification

Following the penetration of the pathogen through the skin (insect bites), localised ulcers and swellings appear. An infection through the consumption of contaminated food or water is somewhat rare and leads to acute diarrhoea; in some cases localised ulcers form on the tongue and throat. Following the inhalation of airborne droplets (aerosol inhalation) or dust carrying the pathogen, the first symptoms of infection are the rapid onset of fever, exhaustion and pain in the extremities. In the majority of cases, atypical pneumonia or pleuropneumonia (inflammation of the pleura) sets in, followed by blood poisoning. If let untreated, a person with Type A tularaemia will experience multi-organ failure and the collapse of the central nervous system; the mortality rate is 40%. When treated mortality is 1%. Type B causes milder symptoms regardless of the mode of transmission. It is characterised by localised lesions and generalised symptoms of an infection. If let untreated, the mortality rate is less than 1%.

## Diagnosis

It is very difficult to isolate the pathogen from secretions or tissues and identify it. Growth of the *Francisella tularensis* culture is very slow and can take several weeks. Therefore, immunological and molecular tests are used to arrive at an indirect diagnosis.

## Transmission

Infection in humans occurs through the skin and mucous membranes coming into contact with infected animals or their excretions. It can also be transmitted indirectly through blood-sucking insects or infected undercooked meat. In animal trials, the infection dose rate for the inhalation of airborne particles or dust carrying the pathogen is 10 bacteria. Person-to-person transmission is unlikely; no such cases have been documented.

## Incubation period

As a general rule, the first symptoms appear between 2 and 5 days after infection. The incubation period can vary from 1 day to 21 days depending on the number and type of pathogens.

## **Prophylaxis**

Although research into an effective vaccination is ongoing, there is currently no licensed vaccine. In the event of suspected exposure, antibiotics can be administered prophylactically (ciprofloxacin, doxycyclin).

## **Therapy**

Tularaemia can be treated effectively with antibiotics (gentamicin, streptomycin).

## ***Francisella tularensis* as a biological weapon**

In the past, a number of countries have carried out research on the cultivation and release of tularaemia. Its bioweapon potential lies in the fact that infection can occur even at very low doses and that it can be transmitted in a variety of ways (aerosol, food, water and insects).