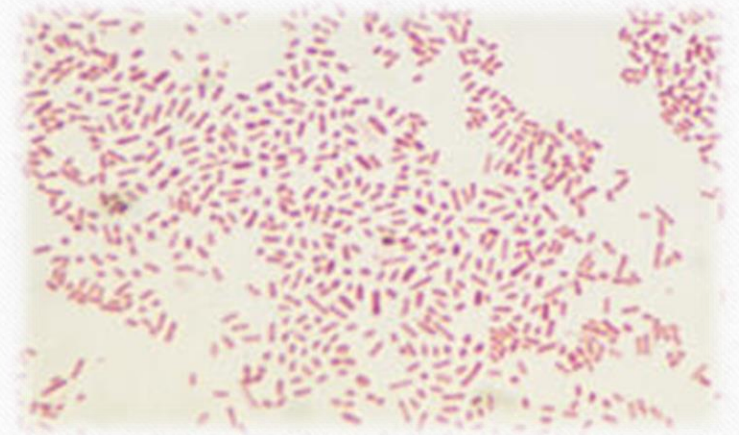
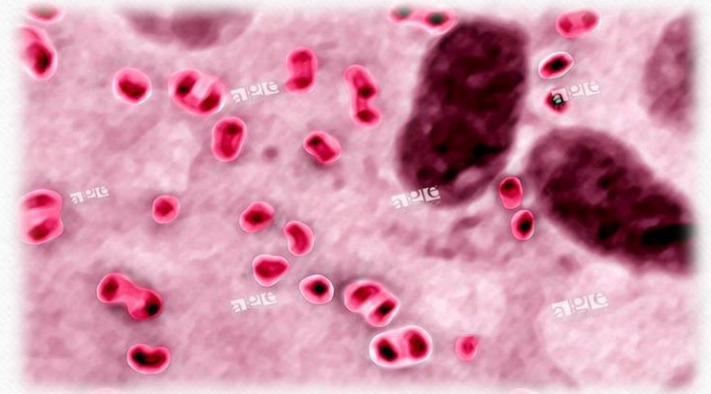


- *Pasteurella multocida*
- *Francisella tularensis*
- *Legionella*
- *Campylobacter*
- *Helicobacter pylori*
- *Bordetella*

Pasteurella multocida

- Gram negative cocobacillus
- Non-motile
- With methylene blue; bipolar staining
- Capsule (hyaluronic acid)
- Oxidase positive



<https://www.sciencephoto.com/media/546591/view/pasteurella-multocida>

- Indole positive
- Don't grow on Mac Conkey Agar, grow on Blood agar and Chocolate agar
- Commensal or opportunistic pathogen of many species of domestic and wild animals and birds.
- Human become infected after following **animal bites**



- Five capsular antigens; A, B, D, E, F and at least 11 somatic LPS antigens have been identified.
- Organisms are killed in a few minutes at 55 °C and by phenol (0.5%) in 15 min. Survive and remain virulent in dried blood for about 3 weeks, and in culture or infected tissues for many months if kept frozen.
- It's endotoxin cause the illness

Animal bites



Infected wound of finger following bite of domestic cat.
Pasteurella multocida was isolated from the wound.

- *P. multocida* can be virulent for many animals and birds, causing **fowl cholera (bloody diarrhea)** and hemorrhagic septicemia, which are usually fatal.
- Human infections (**rare**) usually present as a local abscess at the site of a cat or dog bite, with **cellulitis, adenitis** and some **osteomyelitis**. Also implicated in infections of the respiratory system such as **pneumoniae, bronchitis, nasal sinusitis** (Especially some patients that have respiratory problem). In immunocompromised patients it can cause systemic infection.

- Rare manifestations of disease include meningitis or cerebral abscess (usually follow head injury), endocarditis, pericarditis, septicemia.
- A history of a recent animal bite or of occupational exposure are indicators for suspecting as a *Pasteurella* infection.

Laboratory Diagnosis

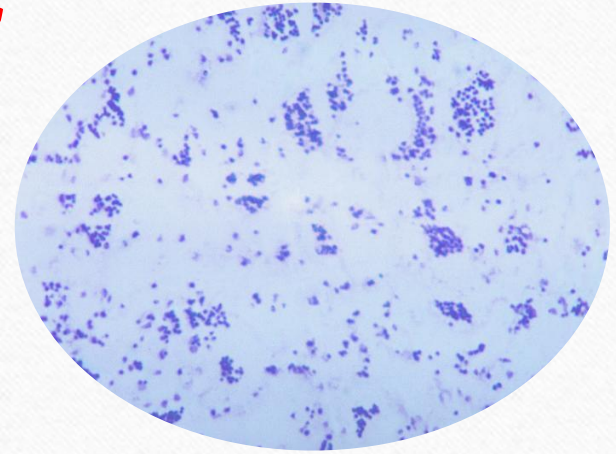
- Material from bite wounds, blood cultures, cerebrospinal fluid (for meningitis) or respiratory secretions are cultured on blood agar. The organisms are identified by various cultural and biochemical test
- PCR
- Serology is unhelpful.

Treatment

- Penicillin
- Tetracycline
- Erythromycin
- Following dog or cat bites antibiotic therapy must be continued for at least 8 weeks.

Francisella tularensis

- Small, Gram negative cocobacillus
- Non motile, strictly aerobic
- Capsulated
- Not grow on ordinary media but grows well on blood agar containing 2% glucose and 1% cysteine hydrochloride



Is killed by moist heat at 55 °C in 10 min. but may remain viable for many years at 10 °C, and for many days in moist soil and in water polluted by infected animals.

Two biovars are recognized;

- Type A (*Francisella tularensis tularensis* or *Francisella tularensis nearctica*) is found only in North America, is often transmitted by ticks and highly pathogenic
- Type B (*Francisella tularensis palaeartica* or *Francisella tularensis holarctica*) occurs in Europe, Asia and North America, is transmitted by mosquitoes and much less virulent.

- Cause **tularemia (rabbit fever, tick fever)**
- Tularemia is first identified in 1911 by McCoy in Tulare, California from squirrel. Then Edward Francis identified in human.
- It occurs mainly in the northern hemisphere, Cases have been reported from North America, From several European countries.

- It can be transmitted by direct contact, by biting flies, mosquitoes and ticks, by contaminated water or meat, or by aerosols.
- Human cases are sporadic, after an acute onset with fever, and headache, the disease develops manifestations that vary according to the route of entry of infection.
- It is one of the most infectious agents, even a very small number can cause disease. (10-50 number)

TABLE 1.

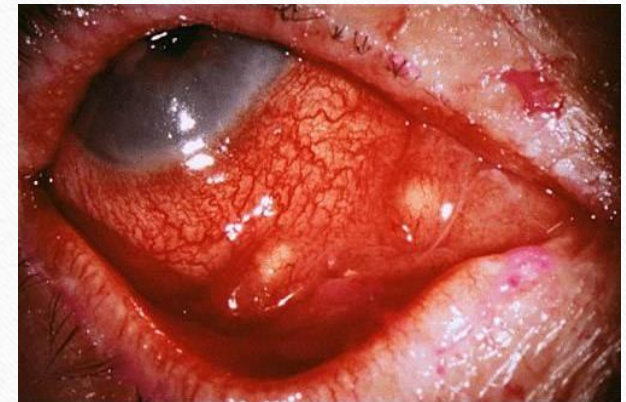
Common Characteristics of the Six Tularemia Clinical Syndromes

Tularemia Syndrome	Characteristics	Portal of Entry
Ulceroglandular	Skin papule followed by ulcer, tender lymphadenopathy, fever	Skin
Glandular	Tender lymphadenopathy, fever	Unknown (likely skin)
Oropharyngeal	Severe pharyngitis, cervical lymphadenitis, fever	Oropharyngeal mucosa
Oculoglandular	Conjunctivitis, Parinaud's oculoglandular syndrome	Conjunctiva
Typhoidal	Fever of unknown cause, sepsis, myalgia, headache	Oropharyngeal mucosa or respiratory tract
Pneumonic	Pneumonia, fever	Respiratory tract

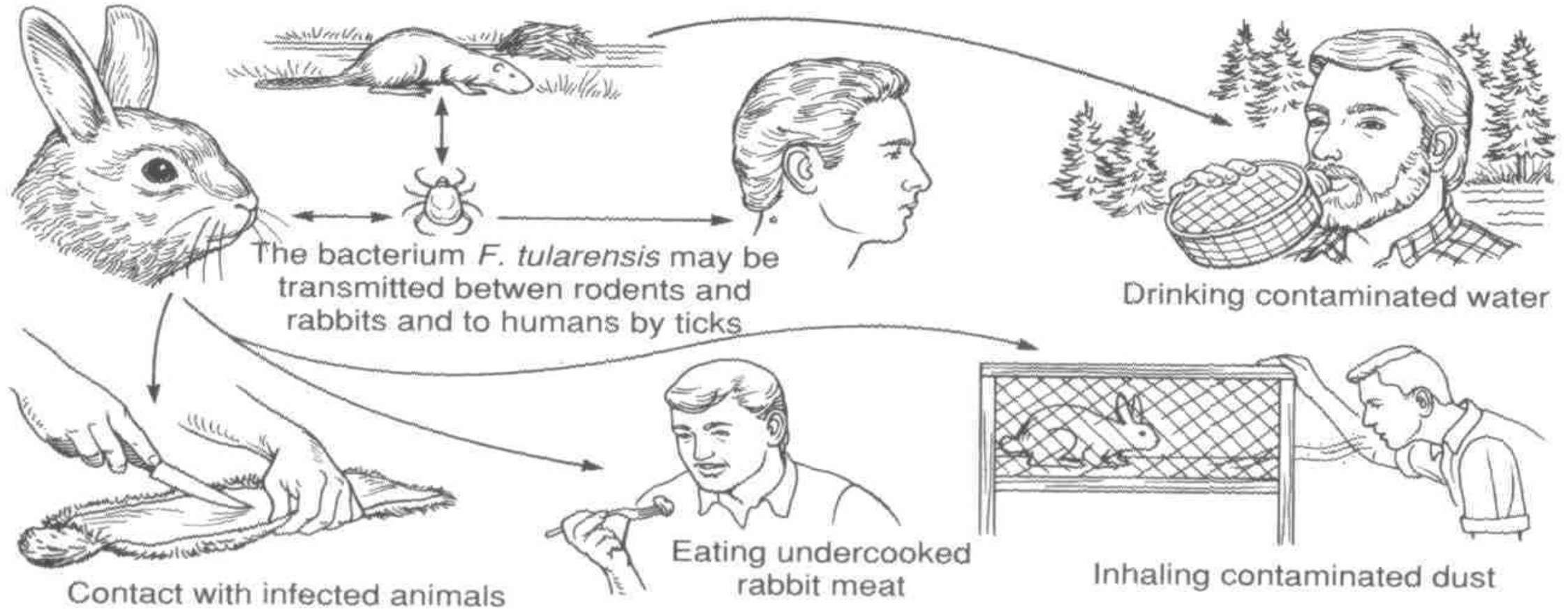


First small punched-out skin ulcer develops at the point of entry, enlargement of lymph nodes even to the extent of bubo formation (ulceroglandular form)

If entry is via the conjunctiva a similar syndrome will develop involving the eye and pre-auricular nodes (oculoglandular form).

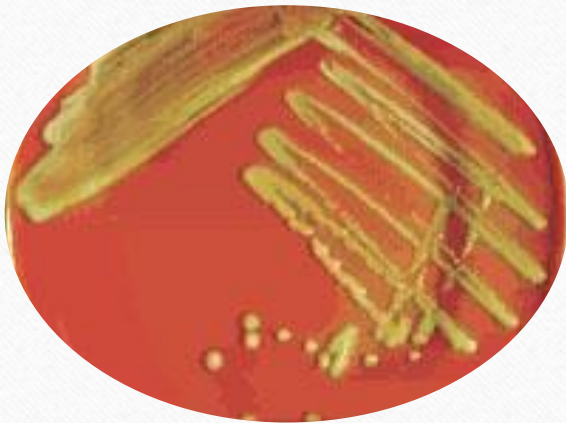


DEFINITION: An acute, infectious disease of wild rabbits and rodents caused by the bacterium, *Francisella tularensis*; also known as *rabbit fever*.



Laboratory Diagnosis

- *F. tularensis* is extremely dangerous to handle in the laboratory and lab 3 containment is required for all manipulations and animal work. (High risk).
- Diagnosed by inoculating tissue samples on the glucose-cysteine blood agar or cysteine heart agar, and identifying small mucoid colonies.



Growth at 72 hours after inoculation. Characteristic opalescence on cysteine heart agar with sheep blood.

- PCR
- Serology is most likely to be positive after 3 weeks.
- *F. tularensis* antibody titers or individual agglutinin titers of 160 are diagnostic.
- ELISA

Treatment

- Sensitive to aminoglycosides, chloramphenicol, fluoroquinolones and tetracycline but resistant to most beta lactam antibiotics.
- Streptomycin and gentamicin are the antibiotics of choice in tularemia

Legionella

- With 48 species, more than 70 serogroups.
- Gram negative rods, motile with polar flagella.
- The organisms characteristically appear as short coccobacilli in tissue but are very pleomorphic on artificial media.

- Strict aerobe
- Legionella are obligative aerobic and nutritionally fastidious.
They require media supplemented with **L-cysteine** and iron for primary isolation.



BCYE Agar with L-cysteine

<https://www.kimyasalal.com/urun/legionella-bcye-agar-w-l-cysteine>

Legionella

- *Legionellaceae* are Gram negative rods whose natural habitat is water.

Legionella pneumophila is the most important species of this group.

- No transmission human to human
- Legionella give rise to two main clinical syndromes.
 1. Legionnaires' disease
 2. Pontiac fever

C. CLINICAL MANIFESTATIONS: 2 FORMS OF DISEASE LEGIONAIRES' DISEASE AND PONTIAC FEVER

LEGIONAIRES' DISEASE

**Portal of entry is respiratory
Acute fibrinopurulent
bronchopneumonia
May have Bacteremia
May vary from mild to severe
fulminant systemic disease
and death**

PONTIAC FEVER

**Acute, self limited, febrile
NOT FATAL
Abrupt onset, myalgia,
malaise, headache
NO PNEUMONIA
May be asymptomatic
Recover in 2 to 5 days**

LEGIONNAIRES' vs. PONTIAC FEVER

	Legionnaires' Disease	Pontiac Fever
Attack rate	< 5%	> 90%
Respiratory complaints	Yes	No
Incubation period	2-10 days	36 hours
Treatment	Antibiotic therapy	Self-limiting; antibiotics not given
Outcome	Hospitalization likely; fatality rate: 10-30%	Hospitalization unlikely; fatality rate of 0%

Legionnaires' disease

- In the summer of 1976 an outbreak of severe pneumoniae that caused many deaths in American Legion members, occurred at a convention in Philadelphia. This form of pneumoniae became known as legionnaires' disease and the bacterium associated with it as *L. pneumophila*.

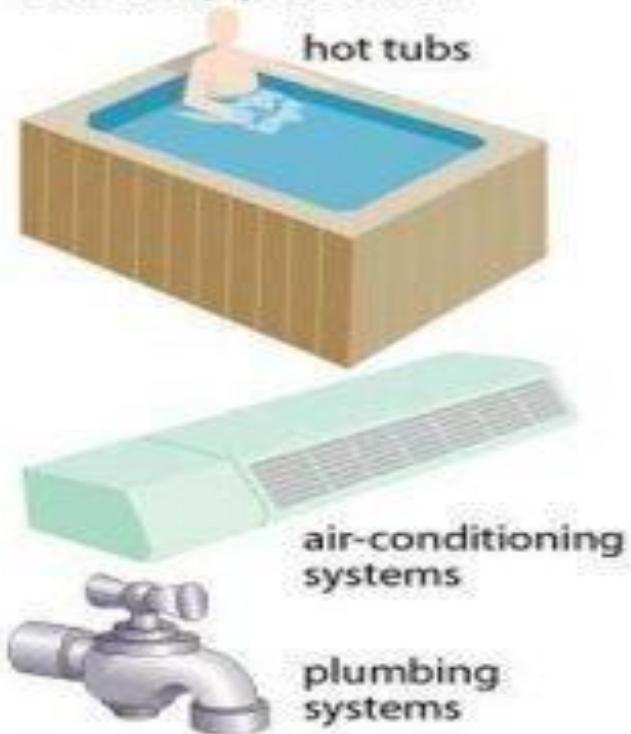
Infection is characterized by;

- An incubation period of 2-10 days, after incubation period
- High fever, chills, dry- nonproductive cough
- Respiratory distress
- Multiorgan disease involving the GIT, central nervous system(Confusion, hallucination and, occasionally focal neurological signs), liver, and kidney is common.
- The primary manifestation is pneumoniae
- It is characteristically more severe and causes considerable morbidity, often leading to death unless therapy is initiated promptly.

Legionnaires' disease

Infection

Caused by bacteria which thrives in warm water and damp places like:



source : WHO, UK NHS

Symptoms



Similar to a severe flu and can include fever, chills, loss of appetite, headache, lethargy

Potentially fatal form of pneumonia



Legionella bacteria

Can not be transmitted from person to person

Treatment

Antibiotics



No vaccine is currently available



Prevention



Water supply systems should be cooled below 20C or heated above 60C

AFP

Pontiac fever

- *L. pneumophila* was responsible for causing a **self-limited**, febrile illness in people working at the Pontiac, Michigan, Public Health Department in 1968.
- Fever, chills, myalgia, malaise and headache but no clinical evidence of disease.

- The symptoms develop over 12 hours, persist for 2 to 5 days, and then resolve spontaneously without antibiotic treatment and with minimal morbidity and no deaths. It is believed that the pathology of this disease is caused by a hyper sensitivity reaction to the organism. Pontiac fever is high in the people exposed.

Diagnosis

- Culture
- PCR and immunofluorescent microscopy: for rapid identification
- Urinary antigen test (Enzyme-linked immunoassays: EIAs): It is used to detect soluble Legionella specific LPS antigens excreted in the urine.
- Nucleic acid amplification assays

- Serology
- Identification: Legionella appear as weakly staining, pleomorphic, thin, gram negative rods. Their growth on BYCE (Buffered charcoal yeast extract) Agar but not on media without L-cysteine is presumptive evidence that organism is Legionella.

Treatment, Prevention and Control

- In vitro susceptibility test are not performed routinely with legionella, because the organisms grow poorly on the media commonly used for these tests. Clinical experience indicate that macrolides or fluoroquinolones should be used for the treatment of Legionella infections.

KEY POINTS FOR LEGIONELLA

- Legionella species are water borne bacilli and include *L. pneumophila*, which is responsible for a form of pneumoniae known as legionnaires' disease and a less serious influenza-like illness called as Pontiac fever.
- Many serogroups are recognized, but human infection is almost always caused by serogroup 1

KEY POINTS FOR LEGIONELLA

- Legionnaires disease is diagnosed by demonstrating the organism in sputum or soluble antigen in urine
- High dose macrolide is used for treatment.
- Suppression of the organism in air-conditioning systems and water supplies in public buildings is central to control of the disease.