

# A Hare Unusual: *Francisella tularensis* Peritonitis Following Orthotopic Liver Transplantation

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## INTRODUCTION

*Francisella tularensis*

- Causes the rare zoonotic disease tularemia
- Transmitted following arthropod bite, inhalation, or ingestion of contaminated water or soil.<sup>1</sup>

Only a couple hundred cases are reported annually by the CDC, with very few reported cases in transplant recipients.<sup>1</sup>

## CASE PRESENTATION

A 59-year-old male who was 79 days post orthotopic liver transplant (OLT) secondary to non-alcoholic steatohepatitis cirrhosis presents with acute onset generalized weakness, abdominal pain, and diarrhea.

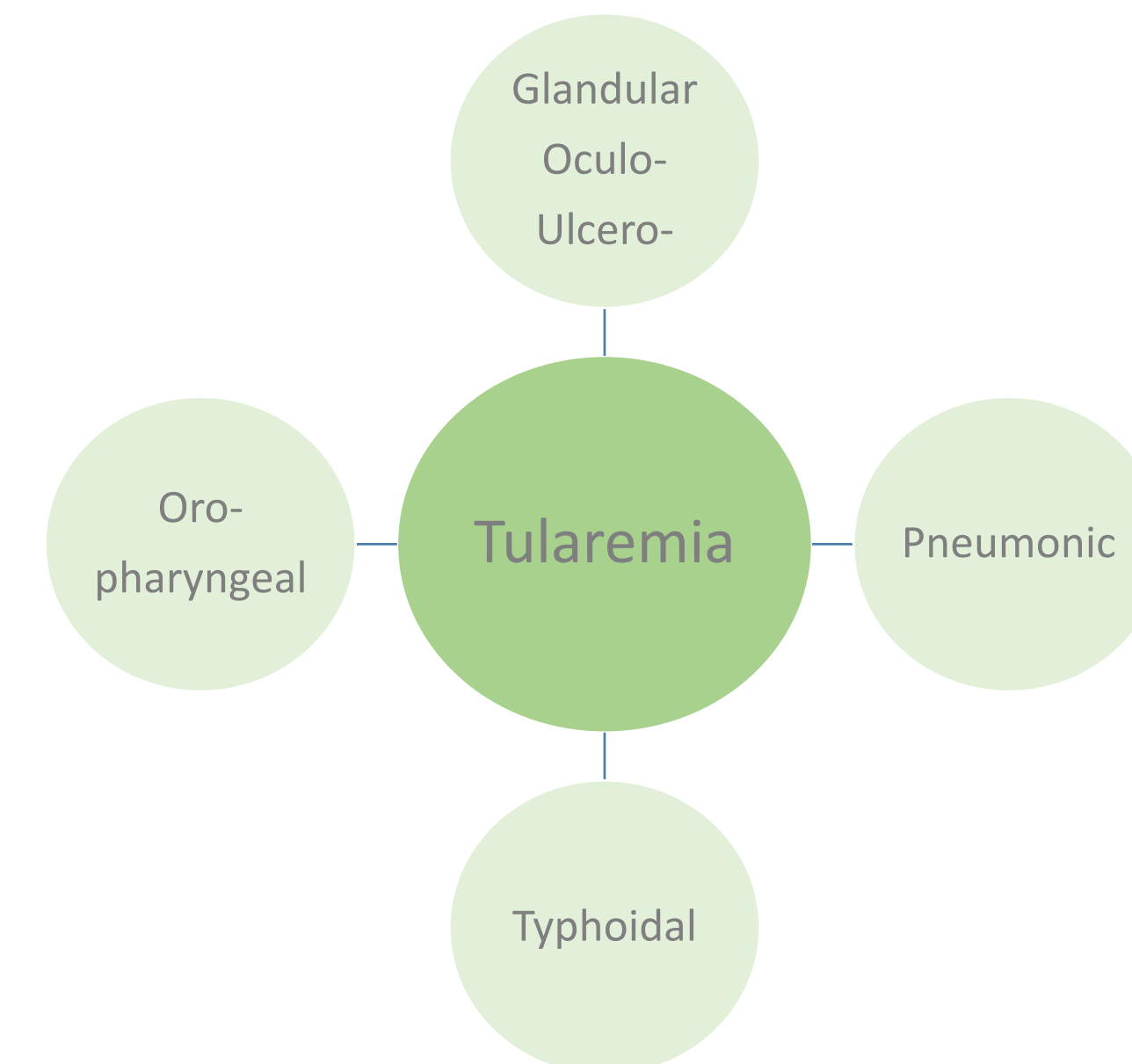
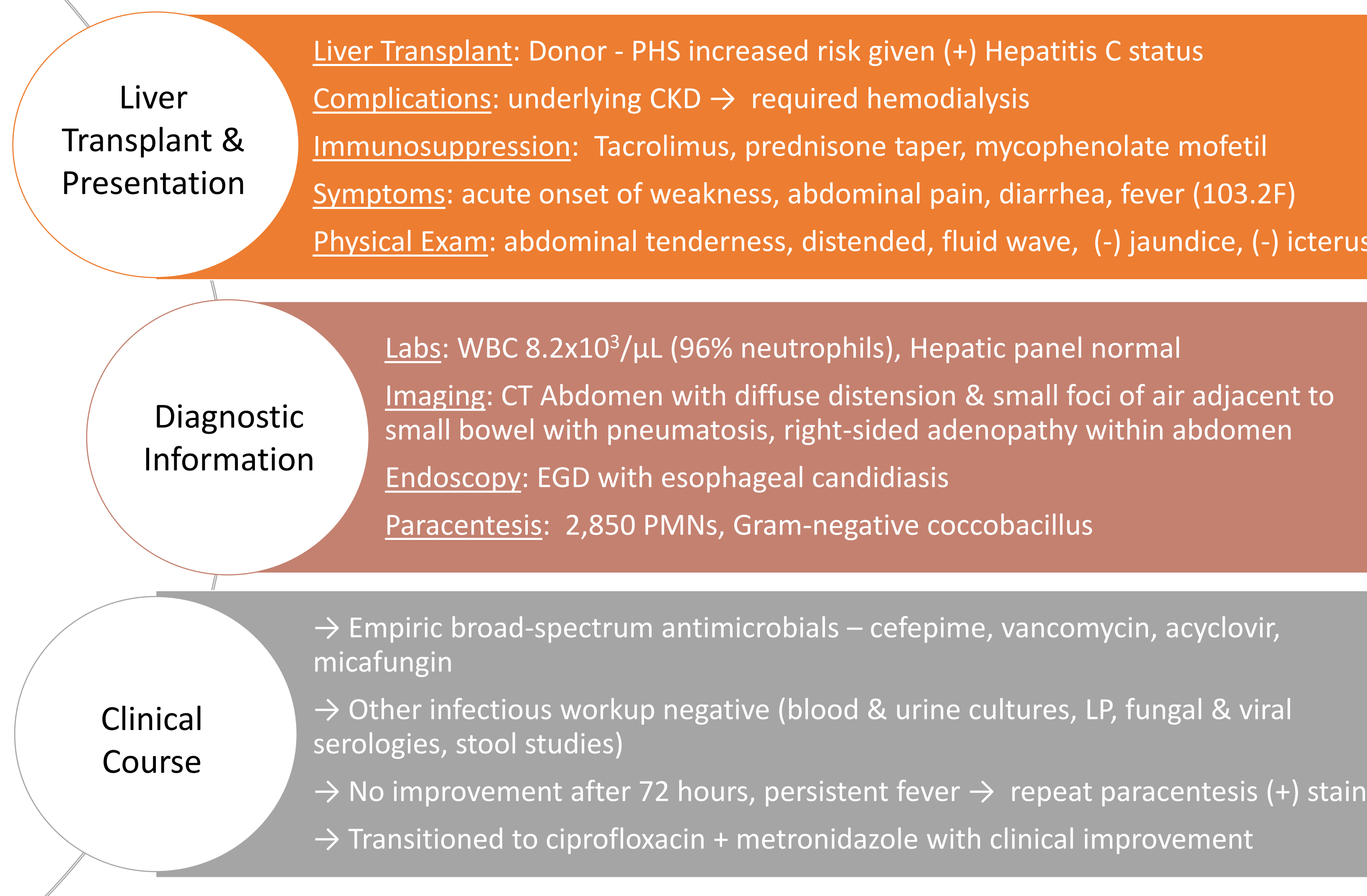


Figure 1: Types of Tularemia. Source: CDC

## FINALIZING THE DIAGNOSIS & TREATMENT

Ascitic fluid culture later speciated by the Ohio Department of Health as *Francisella tularensis*, confirmed by microagglutination and direct fluorescence antibody staining.

When asked about exposures, the patient revealed he was a farmer. He had recently runover rabbits with his tractor, requiring handling and sanitization of contaminated equipment.

With transition to ciprofloxacin 500mg twice daily for 21 days, both fevers and ascites resolved.

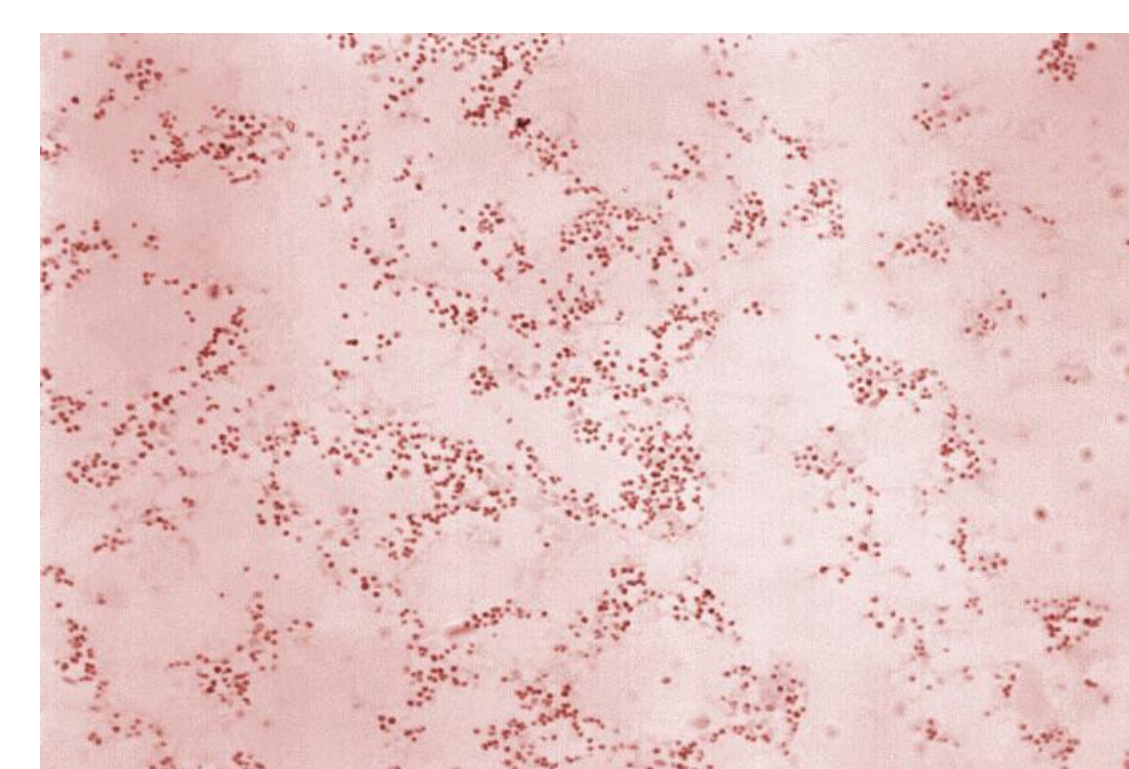


Figure 2: *Francisella tularensis* gram stain. Source: CDC

## LITERATURE REVIEW & CASE COMPARISON

Table 1: Literature review of tularemia in solid organ transplantation including liver transplant recipients, modified from Bahuaud et al.<sup>2</sup>

| Patient                             | Transplant History  | Clinical Presentation  | Diagnosis  | Antibiotic Therapy  | Ref.                                      |
|-------------------------------------|---|--|--|---|---|
| Male, 50 yrs old                    | 3 yrs post-liver transplant for Hep C & EtOH cirrhosis.     | • Fever, pneumonia, myalgias for 72 hours  | • Blood cultures initially negative<br>• Positive for FT at 72 hours                           | Levofloxacin 500mg/day for 21 days  | Limaye, Hooper (1999) <sup>3</sup>        |
| Male 69 yrs old USA<br>Handled hay  | 4 yrs post-kidney transplant for polycystic kidney disease  | • Fevers, chills, fatigue, neck stiffness, vomiting, diarrhea<br>• X-ray with left-sided pneumonia   | • Blood cultures positive initially misidentified<br>• Corrected to FT at 7 days               | Doxycycline for 14 days   | Khoury et al (2005) <sup>4</sup>          |
| 59 yrs old USA                      | 11 yrs post-kidney transplant for polycystic kidney disease | • Persistent fever<br>• Chest CT with multiple nodules   | • BAL with lymph node biopsy: cultures grew FT in 7 days                                       | Fluoroquinolone (unknown dosage and duration)   | Mittal-henkle, Norman (2005) <sup>5</sup> |
| Male 69 yrs old USA<br>Hunting Dogs | 15 yrs post-kidney transplant for IgA nephropathy           | • Fevers, chills, cough, sputum production<br>• X-ray bilateral infiltrates  | • Blood cultures positive for FT after 10 days   | Levofloxacin 500mg/day for 14 days  | Faucon et al (2011) <sup>6</sup>          |
| 24 yrs old Turkey                   | 12 months post-kidney transplant                            | • Fever, cervical adenopathy<br>• Lymph node pathology: chronic necrotizing granulomatous inflammation   | • PCR of lymph node positive for FT<br>• Confirmed by serology later.                          | Doxycycline 100mg BID for 4 weeks   | Ozkok et al (2012) <sup>7</sup>           |
| Male 51 yrs old France              | 7 yrs post-liver transplant                                 | • Septic shock, ARDS, ketoacidosis<br>• CT-scan mediastinal adenopathy + bilateral nodular lesions   | • Blood culture positive after 5 days<br>• FT strain confirmed with sequencing                 | Ciprofloxacin 500 mg BID for 14 days  | Bahuaud et al (2015) <sup>8</sup>         |
| Male 64 yrs old                     | 4 years post-heart transplant                               | • Fever, chills, night sweats, cough, respiratory distress<br>• CT-scan: pleural effusion & mediastinal adenopathy<br>• PET-scan: increased uptake pulmonary nodules | • Pleural fluid cultures negative<br>• PCR and cultures of lymph node biopsies positive for FT | Ciprofloxacin 750 mg BID + gentamicin 300 mg for 7 days, then ciprofloxacin for 14 days | Bahuaud et al (2016) <sup>8</sup>         |

## KEY POINTS FROM TABLE 1

- 1) Pneumonia from FT is the most common post-transplantation
- 2) Fever & mediastinal or abdominal lymphadenopathy frequently seen
- 3) Abnormal features include small bowel pneumatosis, necrotizing granulomatous inflammation

## CONCLUSIONS

We present the reported first case of *Francisella tularensis* peritonitis post-orthotopic liver transplantation.

The presentation of Tularemia amongst immunocompromised hosts is often atypical, which makes diagnosis challenging. Per literature review (Table 1), tularemia usually presents in the pneumonic form in patients who have undergone solid organ transplantation. However, our patient with a liver transplant presented with the typhoidal form with primarily gastrointestinal symptoms.

Consider Tularemia in your differential diagnosis when:

- Persistent fevers and infectious symptoms in immunocompromised hosts without clear diagnosis
  - Social history supporting animal exposures, particularly hares, rodents, or ticks
  - Common gastrointestinal manifestations: abdominal pain, nausea/vomiting, diarrhea
  - **Unique features: abdominal lymphadenopathy on imaging, pneumatosis**
  - **Lack of improvement on broad-spectrum antibiotics, particularly cephalosporins**
- Why? Two *native* β-lactamase genes (*bla1* and *bla2*)<sup>9</sup>

**Antimicrobial management:** Choose effective antibiotics

- Aminoglycosides – streptomycin, gentamycin (10-14 days)
  - preferred for severe cases
- Fluoroquinolones (10-14 days)
  - multiple case reports of success in SOT patients (Table 1)
- Doxycycline (14-21 days)<sup>1</sup>

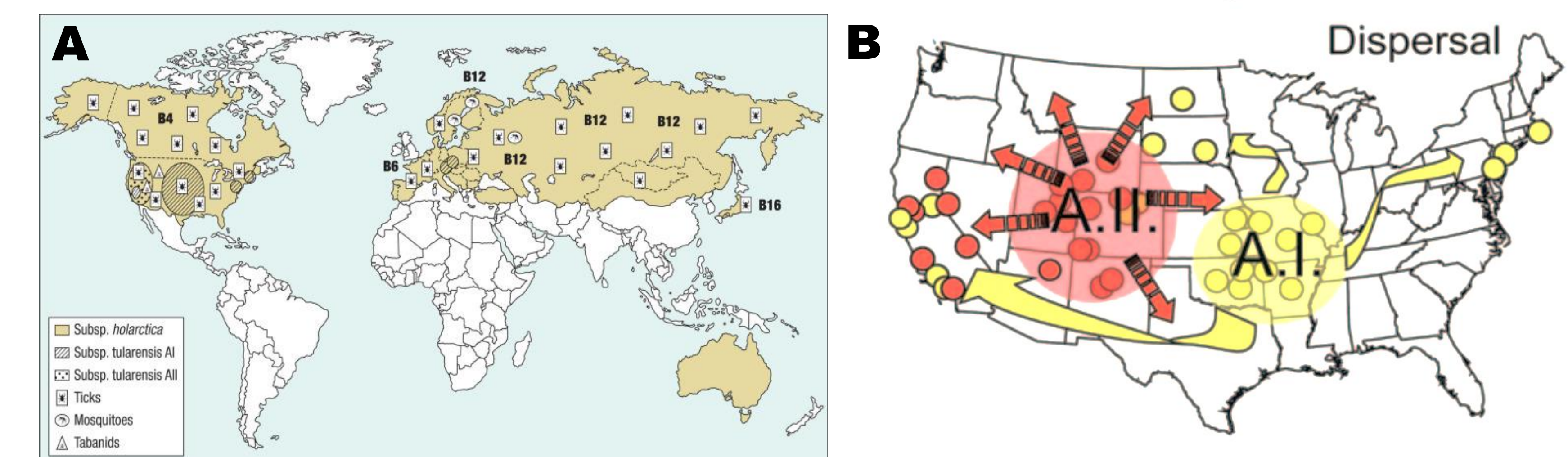


Figure 4A – Global distribution of *Francisella* subspecies, most common in the northern hemisphere.<sup>10</sup>  
4B – National dispersal *F. tularensis* subpopulations AI and AII, the two most common in the United States, demonstrating spread to previously unidentified locations.<sup>11</sup>

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**Disclosures:** All authors have nothing to disclose .

## References:

