Boston University
Research Occupational Health Program

Tom Winters, MD
Medical Director, ROHP

Francisella tularensis
Agent Training
Tom Winters, MD Profile

- Thomas H. Winters MD, FACOEM, FACPM, Principal and Chief Medical Officer of Occupational and Environmental Health Network (OEHN).
- Currently, Medical Director of Harvard Medical School, Harvard School of Public Health, Faculty Arts and Sciences, Harvard HCCM, New England Regional Center of Excellence (NERCE) and BU/BMC Research Occupational Health Program.
- Dr. Winters has over 25 years experience in occupational and environmental medicine. His previous positions have included Medical Director for several manufacturing companies and numerous hospitals, colleges and universities throughout Massachusetts.
- Dr. Winters has expertise in musculo-skeletal disease, toxic tort and radiation exposures, occupational & infectious diseases, and corporate medical consulting.
- Dr. Winters is also a Board Certified in Occupational Medicine, Certified Medical Review Officer, Certified Medical Disability Examiner and Certified Independent Medical Examiner.
Why are we here today?

Goal:

– Safety when working with *Francisella tularensis*
What will be covered?

- Agent description
- Transmission – Routes of exposure
- Symptoms
- Laboratory safety precautions
- Exposure response
- Treatments
• Small gram-negative coccobacillus
• Carried by many animals particularly rabbits
• Causes “tularemia”
  − AKA Rabbit fever, Deer fly fever, Ohara disease, or Francis disease
• Subspecies
  − *F. tularensis* (Type A), *F. holarctica* (Type B) and *F. novicida*
• Investigated as a weapon during cold war
• Now classified as a select agent by CDC
• Survival outside of a host is variable
Reported tularemia cases – United States, 2004-2013

http://www.cdc.gov/tularemia/statistics/map.html
Transmission – Routes of Exposure

- Person-to-person transmission of tularemia has not been documented
- Four routes of exposure

<table>
<thead>
<tr>
<th>Route</th>
<th>Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Exposure (Needle stick or scratch)</td>
<td>Direct skin contact with organism; contact with infected animals or animal products. Water can also become contaminated with the bacteria through contact with infected animals.</td>
</tr>
<tr>
<td>Mucous membrane Splash to Eye(s), Nose or Mouth</td>
<td>Direct mucous membrane contact.</td>
</tr>
<tr>
<td>GI</td>
<td>Consumption of undercooked or raw meat products or dairy products from infected animals.</td>
</tr>
<tr>
<td>Inhalation</td>
<td>Inhalation of dust or aerosols contaminated with F. tularensis bacteria</td>
</tr>
</tbody>
</table>
Symptoms

- The incubation period varies but ranges from 1-14 days typically within 3-5 days.
- Five forms of illnesses, all presenting with fever greater than 100.4
  - **Ulceroglandular** – This is the most common form of tularemia and usually occurs following a tick or deerfly bite, direct lab exposure, or after handling of an infected animal. A skin ulcer appears at the site where the organism entered the body. The ulcer is accompanied by swelling of regional lymph glands, usually in the armpit or groin.
Symptoms cont’d

- **Glandular** – Similar to ulceroglandular tularemia but without an ulcer. Also generally acquired through the bite of an infected tick or deerfly, direct lab exposure or from handling sick or dead animals.

- **Oculoglandular** – This form occurs when the bacteria enter through the eye. This can occur when a person touches his or her eyes. Symptoms include irritation and inflammation of eye and swelling of lymph glands in front of the ear.

- **Oropharyngeal** – This form results from eating or drinking contaminated food or water. Workers with oropharyngeal tularemia may have sore throat, mouth ulcers, tonsillitis, and swelling of lymph glands in the neck.
Symptoms cont’d

- **Pneumonic** – This is the most serious form of tularemia. Symptoms include cough, chest pain, and difficulty breathing. This form results from breathing dusts or aerosols containing the organism. It can also occur when other forms of tularemia (i.e. ulceroglandular) are left untreated and the bacteria spread through the blood stream to the lungs.
Laboratory Safety Precautions

• **BSL3 Containment**
  - Facilities: Ventilation, monitoring systems
  - Security: Card access, iris access, cameras

• **Standard Operating Procedures**
  - Operations
  - Scientific

• **Disposable PPE**
  - Scrubs, gloves, gowns, and shoe covers
  - Respirators
Exposure Response

• Response to known exposure
  – Notify others in the lab of situation

<table>
<thead>
<tr>
<th>If...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Exposure (Needle stick or scratch)</td>
<td>Immediately go to the sink and thoroughly wash the wound with soap and water. Decontaminate any exposed skin surfaces with an antiseptic scrub solution for 15 minutes.</td>
</tr>
<tr>
<td>Mucous Membrane Splash to Eye(s), Nose or Mouth</td>
<td>Exposure should be irrigated vigorously.</td>
</tr>
<tr>
<td>Splash Affecting Garments*</td>
<td>Remove garments that may have become soiled or contaminated and place them in a double red plastic bag.</td>
</tr>
</tbody>
</table>

– Contact Control Center at extension 8-4144
  • Inform them to initiate emergency response
  – Contact ROHP at extension 4-7647
Response to Potential Illness

- If you have presenting symptoms discussed and have worked with Francisella within the last 21 days:
  - If at work, call ROHP (Monday – Friday 8:00 am to 4:30 pm)
  - If off campus go to the nearest ED and notify BU ROHP
    - Inform the physician of your work in the laboratory and the agent that you handle.
    - Provide the wallet-size agent ID card to the physician.
  - Management options for potentially exposed workers include “fever watch”. During a fever watch, the worker monitors their temperature with the instructions to seek immediate treatment for tularemia if they develop a fever (usually defined as a single oral temperature of >101F).
Treatment

• **Antibiotics**
  - Treatment of High Risk Exposure:
    - Streptomycin, gentamicin, or tobramycin (IV)
    - Alternative: doxycycline or high-dose ciprofloxacin
  - Post-exposure Prophylaxis:
    - Doxycycline
    - Alternative: Ciprofloxacin

• **Duration**
  - 10 to 21 days
  - Depends on stage of disease and medication used
Contact and References

• Contact
  − ROHP at (617) 414-7647 – available 24/7 for emergency medical support

• References
  − ROHP website:  http://www.bu.edu/rohp
  − CDC Agent Web Page: http://emergency.cdc.gov/agent/tularemia/facts.asp