



Communicable Disease Corner

Francisella tularensis

CASE REPORT

A 43-year-old male presented to an Emergency department in May 2007 with complaints of feeling "violently" ill with flu-like symptoms including high fever, chills, nausea and vomiting of 3 – 4 days duration. He also had swelling and pain at the site of a laceration on his finger, as well as severe pain and swelling in his left axilla. A swab taken from his finger abscess isolated *Francisella tularensis* (*F. tularensis*), subsp. *holarctica* (Jellison type B).

This man is a hunting outfitter/guide who was on a trip to Northern Alberta and sustained the injury to his finger approximately 10 days previously while skinning a Black Bear. During this trip, four Black Bears were killed over a two-day period. Beaver carcasses were used as bait. The bear hides were removed and salted before being transported to a local taxidermist for mounting. The bear carcasses were left behind in the bush; no meat was used for human consumption. At the taxidermy shop, the hides were punched with identification tags and placed in a pile with several other hides.

As recommended by the Canadian Food Inspection Agency (CFIA) District Veterinarian, cleaning, disinfection and sterilization by an approved taxidermy shop was necessary to kill potential *F. tularensis* on the hides. In addition, the local taxidermist who initially received the hides was required to clean and disinfect areas in the shop where the hides had been stored.

Other potential contacts to the bear skin of interest were the members of the hunting party and staff at the taxidermy shop, all of whom remained asymptomatic during the incubation period. The laboratory

staff who handled the clinical specimens were also possibly exposed to the pathogen, and Occupational Health and Safety measures (baseline serology collected and stored for future testing if required; active monitoring and surveillance for the duration of the incubation period) were implemented for this group.

There were no further cases of *F. tularensis* infection as a result of this incident. The local taxidermy shop was cleaned thoroughly with a solution of bleach and water, and potentially contaminated hides were sent to a specially licensed taxidermist for comprehensive sterilization and disinfection as per CFIA protocol. Any other items that may have been contaminated were either cleaned thoroughly or burned. After 10 days of intravenous antibiotic therapy, the case was much improved and expected to make a full recovery.

DISCUSSION

Tularemia is a bacterial zoonosis caused by *Francisella tularensis*, which is one of the most infectious pathogenic bacteria known¹. Inoculation or inhalation of as few as 10 organisms is sufficient to cause disease. *F. tularensis* is common in many animal hosts and habitats and can be found in contaminated water, soil, and vegetation. Sources of infection include nearly 100 species of wild mammals (e.g. beavers, rabbits, hares, muskrats, prairie dogs, rats, voles); at least nine species of domestic animals (e.g. sheep, cattle, cats); bloodsucking arthropods that bite these animals (e.g. ticks and deerflies); as well as soil and water polluted by infected animals². It is also possible for frozen rabbit meat to remain infective for more than three years^{2,3}. Although humans can develop severe and sometimes fatal illness, they do not transmit the disease to others. Humans can become incidentally infected through occupational or recreational environmental exposures such as:

- a bite from an infected tick or other insect
- handling infected animal carcasses
- eating or drinking contaminated food or water

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Francisella tularensis cont'd.

- inhaling *F. tularensis* bacteria

Most often Tularemia presents as a skin ulcer at the site of introduction of the organism along with swelling of the regional lymph nodes. Disease onset is usually sudden with flu-like symptoms, high fever, chills, fatigue, general body aches, headache and nausea. Ingesting the organism may cause a painful pharyngitis, abdominal pain, diarrhea and vomiting. Inhalation of infectious material may result in respiratory involvement or a primary septicemic syndrome. Pneumonia could complicate the clinical picture; prompt identification and specific treatment are required to prevent serious symptoms from developing.

Two subspecies with different pathogenicity cause disease in humans³:

F. tularensis subsp. *Tularensis* (Jellison type A) - highly virulent, with a case fatality rate of 5% - 15% primarily due to untreated respiratory illness; case fatality rate is low with appropriate antibiotic therapy.

F. tularensis subsp. *holarctica* (Jellison type B) - less virulent and produce few fatalities, even without treatment.

Note: Tularemia is a potential agent for intentional use as a biological weapon, especially if aerosolized^{4,5}. A significant amount of the tularemia bacteria can be cultivated in a laboratory; however, manufacturing an effective aerosol weapon would involve considerable sophistication. Cases acquired by inhalation present as primary pneumonia. Such cases require prompt identification and specific treatment to prevent a fatal outcome.

Incidence

Worldwide incidence of naturally occurring tularemia is unknown; disease is likely greatly under-recognized and under-reported. Most cases in the United States occur between June and September, when arthropod-borne transmission is most common. Cases in winter most commonly occur among hunters and trappers who handle infected animal carcasses.

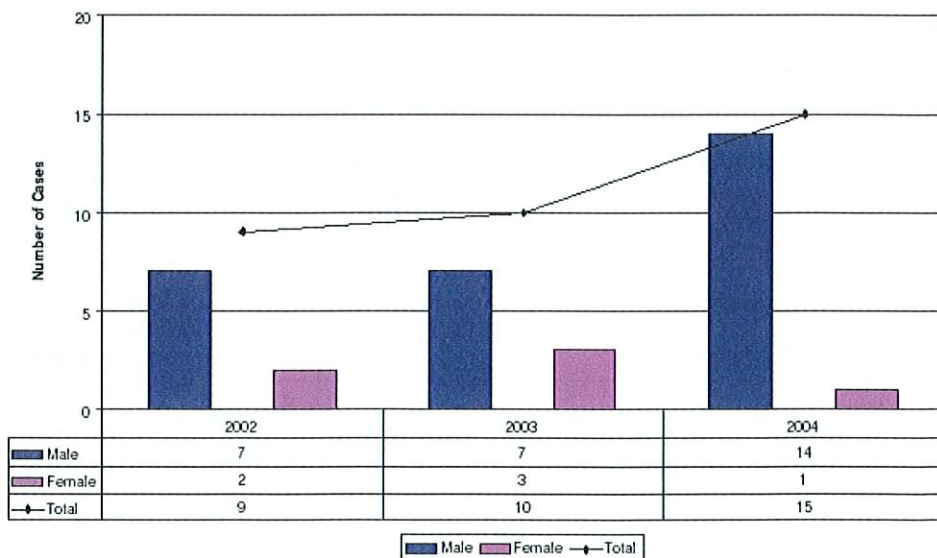
In Canada, 289 cases of tularemia were reported between

1940 and 1981, and 12 deaths⁶. The number of cases of tularemia reported in Canada between 2002 and 2004⁷ is shown in Figure 1:

- **9 cases reported in 2002** (Quebec 8, Manitoba 1); 1 case age 25-29 years old, 1 case age 40-59 years old, 7 cases age over 60 years old.
- **10 cases reported in 2003** (Quebec 8, Ontario 1, British Columbia 1); 2 cases age 5-9, 1 case age 15-19 years old, 1 case age 30-39 years old, 3 cases age 40-59 years old, 3 cases age over 60 years old.
- **15 cases reported in 2004** (New-Brunswick 2, Quebec 8, Ontario 2, Manitoba 1, Saskatchewan 1, Yukon 1); 1 case age 10-14 years old, 1 case age 20-24 years old, 1 case age 30-39 years old, 5 cases age 40-59 years old, 6 cases age over 60 years old.

The first case of tularemia was reported in Alberta in 1932, from a case that was identified in 1931⁸. There were 35 cases reported between 1931 and 1944; 26 occurred during the months of June - October and the majority of cases were traced to contact with rabbits (21); contact with ticks (3), cats (2), and ground squirrels (2) was also reported. Four cases were fatal. In the past two decades (1987-2007), nine cases have been reported in Alberta⁹.

Figure 1. Tularemia - Number of Reported Cases, Canada, 2002 to 2004



Francisella tularensis cont'd.

References

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⁵Minnesota Department of Health. Bioterrorism Fact sheet 9/11/2006. <http://www.health.state.mn.us/divs/idepc/diseases/tularemia/tularemia.html>

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⁷Public Health Agency of Canada. Notifiable Diseases on Line. http://dsol-smed.phac-aspc.gc.ca/dsol-smed/ndis/disease2/tula_e.html

⁸Bow, M. R., & Brown, J. H. (1946). Tularemia: a report on 40 cases in Alberta, Canada, 1931-1944. *American Journal of Public Health*, 46, 494-500.

⁹Alberta Health & Wellness. (2007). Disease Control and Prevention. *Communicable Disease Reporting System*.

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Monthly Data - April

Immunization

The following table is a summary of preschool immunization within the Capital Health Region. It shows completed immunization rates for the month of April 2007. The immunization targets are set by Alberta Health and Wellness.

4 Months			
	DTaP-IPV-Hib	Meningo-C	Pneumo-C
Imm/Eligible	1049/1097	1044/1097	1047/1097
(% Imm)	96%	95%	95%
Target	95%	95%	95%

Legend:

DTaP-IPV-Hib – Diphtheria, Tetanus, acellular Pertussis, Polio, Haemophilus influenzae type b

Meningo-C – Meningococcal Conjugate

Pneumo-C – Pneumococcal Conjugate

MMR – Measles, Mumps, Rubella

Varicella – Chickenpox

15 Months					
	DTaP-IPV-Hib	Meningo-C	Pneumo-C	MMR	Varicella*
Imm/Eligible	938/991	940/991	931/991	870/991	862/991
(% Imm)	95%	95%	94%	88%	87%
Target	95%	95%	95%	95%	95%

24 Months					
	DTaP-IPV-Hib	Meningo-C	Pneumo-C	MMR	Varicella*
Imm/Eligible	877/1007	957/1007	878/1007	942/1007	924/1007
(% Imm)	87%	95%	87%	94%	92%
Target	97%	97%	97%	98%	98%

* Number immunized includes children who had disease



COMMUNITY INFECTION CONTROL

Incidence of MRSA, VRE and ESBL within the CH Region

Type of Organism	April 2007	Year to Date 2007	Year to Date 2006
MRSA	138	491	251
VRE	7	50	45
ESBL	41	128	76

Legend:

MRSA - Methicillin - Resistant *Staphylococcus aureus*

VRE - Vancomycin - Resistant Enterococcus

ESBL - Extended Spectrum Beta-lactamase Producing Organisms