Medical NBC Series Briefing Series

Medical NBC Aspects of **TULAREMIA**

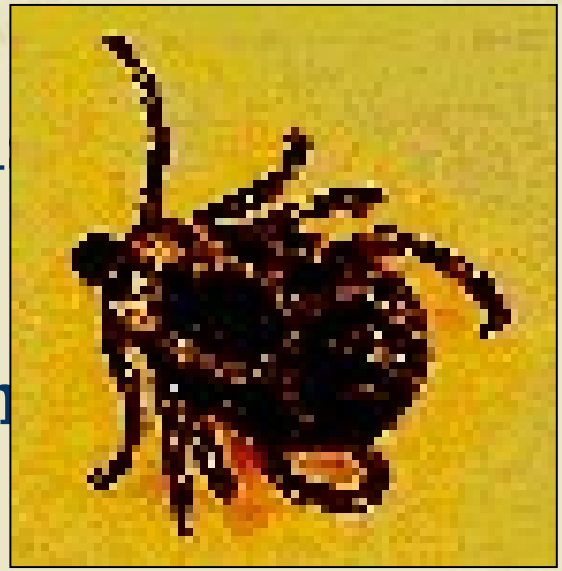
Purpose

- ***This presentation is part of a <u>series</u> developed by the Medical NBC Staff at The U.S. Army Office of The Surgeon General.***
- ***The information presented addresses medical issues, both operational and clinical, of various NBC agents.***
- ***These presentations were developed for the medical NBC officer to use in briefing either medical or maneuver commanders.***
- ***Information in the presentations includes physical data of the agent, signs and symptoms, means of dispersion, treatment for the agent, medical resources required, issues about investigational new drugs or vaccines, and epidemiological concerns.***
- ***Notes pages have been provided for reference.***

Office of the Surgeon General
for the Army

Outline

- Background
- Battlefield Respon
- Medical Response
- Command and Con
- References



North American Deer Tick

Background

- General Background
- Tularemia Disease Course Summary
- Disease Backgroun
- Signs and Sympton
- Treatment
- Diagnosis
- Weaponization

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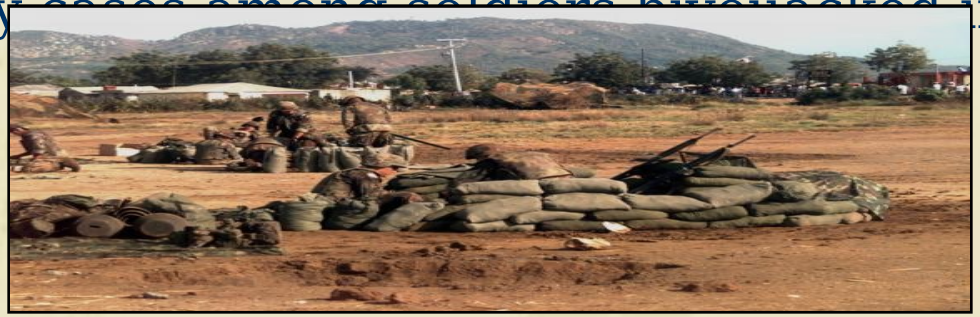
General Background

- **Transmitted by arthropods or infected animals –**

  5 to 10% fatality rate
- **Contaminated food or water**
- **In**

General Background

- **Isolated in 1911 – caused a plague-like illness in Tulare County, California**
- **Found in the northern hemisphere and reported in U.S in six states**
- **In U.S., most cases associated with rabbits, hares, and ticks**
- **Largest outbreak in the U.S. occurred in 1946**
  - Fifty cases among soldiers bivouacked in Tennessee



Tularemia Disease Course Summary (Aerosol)

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
EXPOSURE	Incubation Can range from 1-21 Days	Exposed/non-symptomatic patients are ambulatory		Acute, malaise, fever, cough, chest pain or tightness, ulcers, severe throat pain		
Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
Patients ambulatory or littered based on severity of symptoms		Symptoms similar to pneumonia				
Day 15	Day16	Day 17	Day 18	Day19	Day 20	Day 21
Patients ambulatory or littered based on severity of symptoms		Symptoms similar to pneumonia				
Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28
Patients ambulatory or littered based on severity of symptoms		Symptoms similar to pneumonia				
Day 29	Day 30	Day 31	Day 32	Day33	Day34	Day 35
Patients ambulatory or littered based on severity of symptoms		Symptoms similar to pneumonia				

30-80% fatality in untreated patients from days 15 to 35

Chronic medical problems may occur for months in many patients

Disease Background

- Infectious dose is 1 to 10 organisms by aerosol or introduction through the skin
- Can remain viable for weeks in water, soil, and carcasses
- Resistant to freezing
- Easily killed by heat and disinfectants

Signs and Symptoms Incubation

- **Incubation period averages from 1-21 days**
  - Period is shorter for a biological warfare aerosolized exposure: 3-5 days
- **Acute clinical manifestations occur immediately after incubation**

Signs and Symptoms Based on Exposure

- **Ingestion –pharyngeal tularemia**
  - 5-10% fatality
  - Seve hroat ulcer

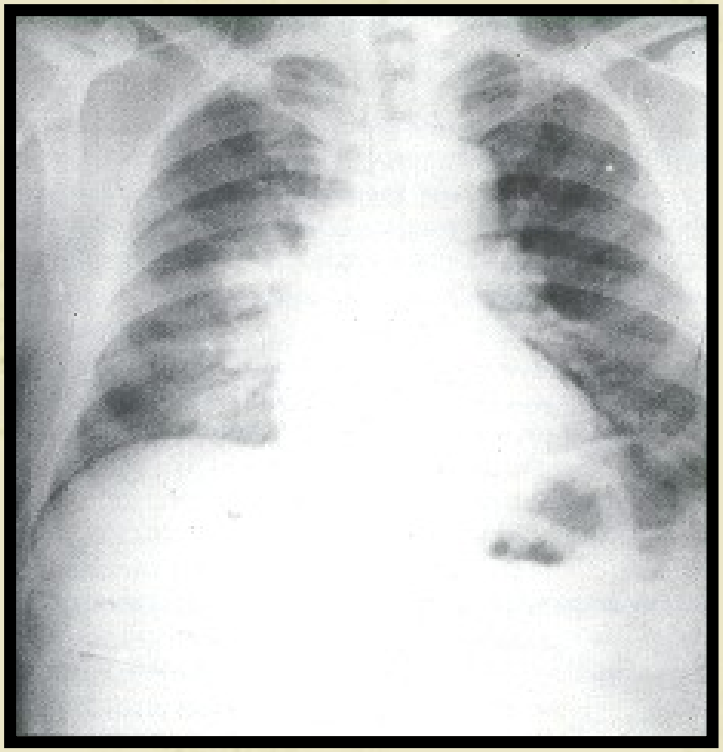
Signs and Symptoms Based on Exposure

- **Contact - Skin/mucous membrane: ulceroglandular tularemia**
  - 5-10% fatality
  - Fever, chills, malaise, headache, skin ly

Signs and Symptoms – Based on Exposure

- **Aerosol – typhoidal tularemia, oculoglandular (eye infection)**
  - 30-80% fatality
  - Fever, cough, chest pain/tightness, cough, conjunct

Diseased Lungs



Textbook of Military Medicine

Signs and Symptoms – Clinical Manifestations

Fever
Chills
Headache
Cutaneous ulcers or lesions
Enlarged lymph nodes (lymphadenopathy)
Cough
Pneumonia
Sore throat
Chest pain


Lymphadenopathy

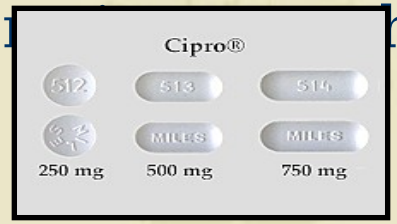
Muscle soreness (myalgia)
Joint pain (arthralgia)
Back pain
Stiff neck
Vomiting
Abdominal pain
Diarrhea
Painful urination (dysuria)

Treatment Pre-Exposure Prophylaxis Vaccinate/Antibiotics

- **Live attenuated vaccine**
  - Used at USAMRIID under the investigational new drug protocol
- **Antibiotics**
  - Ciprofloxacin and doxycycline may give protection (based on lab studies)

Treatment Post-Exposure Prophylaxis

- **Following an aerosol BW attack, one of theses antibiotics may be used:**
  - Doxycycline 100mg orally every 12 hours for 2 weeks
  - Tetracycline 500 mg orally every 6 hours for 2 weeks
  - Ciprofloxacin 500 mg orally every 12 hours for 2 weeks
  - Genetically engineered strains of weaponized tularemia maybe r[illegible]he usual antibiotics



Treatment

- **Established disease**
  - Streptomycin, 15 to 20 mg/kg/day for 14 days
  - Gentamicin, 3 to 5 mg/kg/day for 14 days
- **Therap ctive in 48 hou**

Diagnosis

- **Blood testing for laboratory confirmation after clinical diagnosis rather than cultures**
  - **–Cultures pose a significant hazard to lab personnel**
  - **–Cultures must be processed at a BL-3 lab (usually not available at Echelons I-IV)**
  - **–Lab officer must follow strict SOP's for handling hazardous samples**

Current Situation

- **Several countries developed capabilities of weaponizing Tularemia**
- **High infectivity after aerosolization poses a significant threat to ground troops**
  - Easily weaponized
  - Not very stable in the environment
- **Post-exposure treatments are effective if given early in the disease course**
- **Antibiotic therapy is readily available and easy to acquire**

Weaponization

- **Aerosolization in either wet or dry form**
  - High infectivity rate
  - Incubation 3 to 5 days
  - Abrupt onset fever, chills, headaches, myalgia, etc., with non-productive co
- **Con water sup**

Battlefield Response to Tularemia

- **Detect**
- **Protect**
  - Individual protect
  - Collective protect

Detect

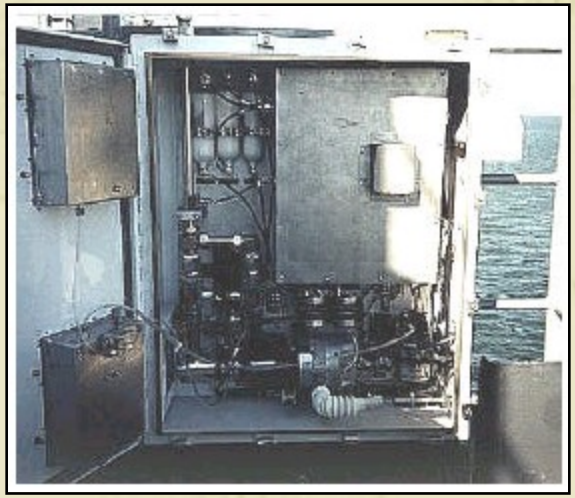
- **Possible methods of detection:**
  - Detection of agent in the environment
  - Clinical
  - Medical surveillance
- **Coordination enhances detection capability**
- **PVNTMED personnel test water and food sources**
- **Diagnosis of tularemia is not presumptive of a BW attack – tularemia is naturally occurring**

Detection of Agent in the Environment

- **Biological Smart Tickets**
- **Enzyme Linked Immunosorbant Assay (ELISA) (Fielded with the 520th TAML)**
- **Polymerase Chain Reaction (PCR) (Fielded with the 520th TAML)**

Detection of Agent in the Environment

- **M31E1 Biological Integrated Detection System (BIDS)**
- **Interim Biolog**



Clinical Detection

- **Sudden presentation of**
  - Pnuemonic and typhoidal symptoms
  - Possible oculoglanular disease

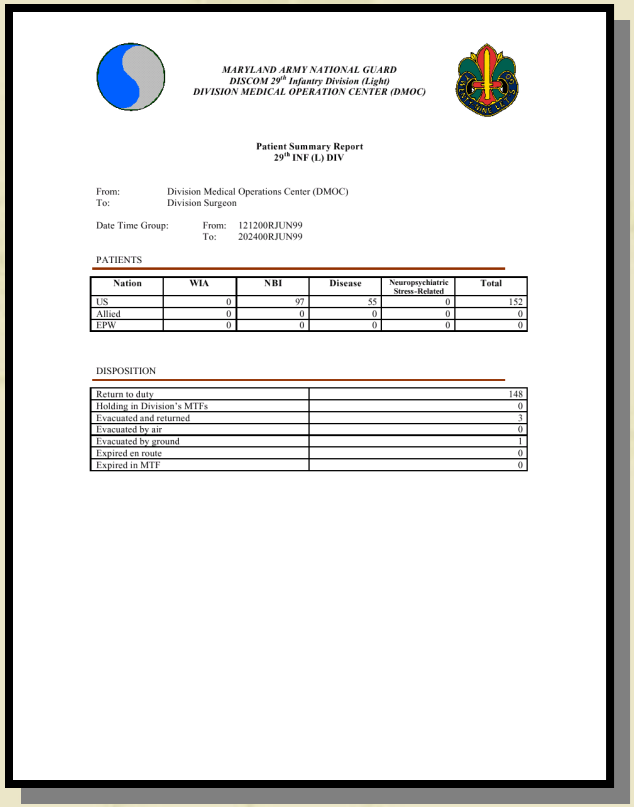
Laboratory Confirmation

- **Division medical assets lack lab equipment to conduct test to determine tularemia**
- **Specimen must be sent to theater level or CONUS lab**
  - Unit SOP's for collection
  - Blood samples for culture in a ***BL-3 Lab***
  - ELISA –520th TAML
- **Lab specimens should be submitted to the correct diagnostic laboratory**
  - Responsibility of the Lab Officer
  - Ensure the chain of command is aware of the situation
- **Contact lab prior to collection or preparation in order to assure proper methods are utilized**

Laboratory Confirmation

- **Points of contact for biological sampling and shipping**
  - Corps Chemical Officer
  - Technical Escort Unit
  - AFMIC
  - 520th TAML
  - USAMRIID
  - WRAIR
  - CDC

Detection
Medical Surveillance



MARYLAND ARMY NATIONAL GUARD
DISCOM 29th Infantry Division (Light)
DIVISION MEDICAL OPERATION CENTER (DMOC)

Patient Summary Report
29th INF (L) DIV

From: Division Medical Operations Center (DMOC)
To: Division Surgeon

Date Time Group: From: 121200RJUN99
To: 202400RJUN99

PATIENTS

Nation	WIA	NBI	Disease	Neuropsychiatric Stress-Related	Total
US	0	97	55	0	152
Allied	0	0	0	0	0
EPW	0	0	0	0	0

DISPOSITION

Return to duty	148
Holding in Division's MTFs	0
Evacuated and returned	3
Evacuated by air	0
Evacuated by ground	1
Expired en route	0
Expired in MTF	0

- **Clues in the daily medical disposition reports**
  - Unexpected high numbers of fevers, malaise, acute pneumonia, coughing, chest pain
  - Eye irritations related to oculoglandular disease.

Protect
Individual Protection

- **Individual Protection**
  - Mask only is sufficient for respiratory protection against tularemia.
  - Standard uniform clothing affords a reasonable protection against dermal exposure to biological agents
  - Casualties unable to wear MOPP should be handled in casualty wraps

Protect
Collective Protection

- **Collective Protection**
  - Hardened or unhardened shelter equipped with an air filtration unit providing overpressure
  - Standard universal precautions should be employed as individuals are brought inside the collective protection units
  - Tularemia is not communicable from person to person
  - Water must be thoroughly disinfected
  - All food must be thoroughly heated to kill any organisms

Medical Response to Tularemia

- Triage and Evacuat
- Infection Control
- Resource Requirem

Triage and Evacuation

- **Triage**
  - Priorities based on severity of symptoms
  - Respiratory support needs will increase priorities
- **Evacuation – Delayed or Immediate (depending on severity of symptoms)**
  - Required of all symptomatic patients in Echelon I & II; Echelon III &IV based on priority
  - Standard evacuation assets may be used
  - Observe standard infection control precautions during evacuation

Infection Control

- **Tularemia is not communicable from person to person**
- **Universal precautions for patients handling**
- **Food and water decontamination (PVNTMED)**
- **Patient remains - Quartermaster section**
  - Decontamination, embalming, transportation in hermetically sealed containers

Resource Requirements

- **Evacuation Assets**
- **Supportive therapies**
  - Post-exposure oral antibiotics
  - Symptomatic patient antibiotics
- **Intensive care facilities for severely respiratory-compromised patients**

Command and Control

- **Intelligence**
  - Medical surveillance and intelligence reports are key to keep the Command alert to the situation
- **Maneuver**
  - Movement of units should not be effected
- **Logistics**
  - Additional Class VIII materials will be required and evacuation routes will be heavily utilized
- **Manpower**
  - Many soldiers may be affected by aerosol dissemination

Command Response to Psychological Impact

- **May vary from person to person**
- Psychological Operations
  - Rumors, panic, misinformation
  - Soldiers may isolate themselves in fear of disease spread
  - Physical appearance of the rash may adversely affect other soldiers
- Countermeasures
  - LEADERSHIP is responsible for countering psychological impacts through education and training of the soldiers
  - Implementation of defensive measures such as crisis stress management teams

Summary

- **Tularemia is highly infectious when aerosolized**
- **Tularemia has been weponized**
- **Detection may not occur until after exposure and patients are reported**
- **Command decisions that will be required upon detection of tularemia**
  - Evacuation: Patients need immediate care for a full recovery. Methods of evacuation?
  - Treatment: Procuring antibiotics to treat exposed yet non-symptomatic individuals.

References

- **Biological and Chemical Warfare Online Repository and Technical Holding System (BACWORTH), Version 3.0. Battelle Memorial Institute, 1997.**
- **Department of the Army. FM 8-10-6: *Medical Evacuation in a Theater of Operations*. April 2000.**
- **Department of the Army. FM 8-10:** *Health Service Support In A Theater of Operations.* **March 1991.**
- **Department of the Army. FM 8-284:** *Treatment of Biological Warfare Agent Casualties*. **July 2000.**
- **Department of the Army, U.S. Army Medical Research Institute of Infectious Diseases.** *Medical Management of Biological Casualties*. **July 1998.**
- **Department of the Army, U.S. Army Medical Research Institute of Chemical Defense. *Medical Management of Chemical and Biological Casualties*. May 2000.**
- **Henderson, D.A., Bioterrorism as a Public Health Threat. *Emerging Infectious Diseases* Vol 4 No 3, July 1998.**
- ***Medical Aspects of Chemical and Biological Warfare* (in *Textbook of Military Medicine Series Part I: Warfare, Weaponry, and the Casualty*), edited by F. R. Sidell, E. T. Takafuji, and D. R. Franz. Washington, DC: TMM Publications, 1997.**
- **National Research Council and Institute of Medicine., *Chemical and Biological Terrorism, Research and Development to Improve Civilian Medical Response,* Washington DC: National Academy Press, 1999.**
- ***Tularemia: A 30-Year Experience With 88 Cases.* Evan, Martin E., M.D.; Gregory, David W., M.D.; Schaffner, William, M.D.; McGee, Zell A., M.D. 1985, Vol.64, No.4, pp. 263-264, 258**
- **USACHPPM, Technical Guide 244: *The Medical NBC Battlebook,* July 1999.**

Battelle Memorial Institute created this presentation for the U.S. Army Office of the Surgeon General under the Chemical Biological Information Analysis Center Task 009, Delivery Number 0018.