VDL BSL-3 Emergency Response Packet
TAKE THIS PACKET WITH YOU!

- Emergency Contact Information
- Workers’ Compensation Information
- Directions to Authorized Treating Physicians
- Directions to Fort Collins Emergency Room
- Biosafety Incident Report Form
- Infectious Agent Fact Sheets:

| Bacillus anthracis                     | Rabies Virus                        |
| Brucella spp.                         | Rift Valley Fever Virus            |
| Coxiella burnetti                     | Velogenic Newcastle Disease Virus   |
| Francisella tularensis               | Vesicular Stomatitis Virus (Low risk, minimally zoonotic) |
| Highly Pathogenic Avian Influenza     | Yersinia pestis                    |
| Pandemic H1N1 Influenza Virus         |                                    |

Updated 12/2014
The most up to date version of this document can be found in the Biosafety or Occupational Health Websites under the “Illness Procedure and “Emergency Response Packet” Bar: http://www.ehs.colostate.edu/WOHSP/Bs3Packets.aspx
# Emergency Phone Numbers

<table>
<thead>
<tr>
<th>BIOSAFETY EMERGENCY NUMBER</th>
<th>491-0270</th>
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<tbody>
<tr>
<td><strong>Lab Director</strong></td>
<td></td>
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<tr>
<td>Barb Powers</td>
<td></td>
</tr>
<tr>
<td>Office: 297-1285; Cell: 218-0909; Home: 221-5729</td>
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<tr>
<td><strong>BSL3 Director/Section Head</strong></td>
<td></td>
</tr>
<tr>
<td>Kristy Pabilonia</td>
<td></td>
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<tr>
<td>Office: 297-4109; Cell: 481-3685</td>
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<tr>
<td><strong>PVH Emergency Room</strong></td>
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<tr>
<td>495-7000</td>
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<tr>
<td><strong>Occupational Health Coordinator</strong></td>
<td></td>
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<tr>
<td>Office: 491-3102; Cell: 420-8172</td>
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</tbody>
</table>
Workers’ Compensation Procedure

Updated 12/2014

NOTE: Workers Compensation Statutes change frequently, and every effort has been made to update this document accordingly. However, Risk Management is the source for the most current Workers’ Compensation procedures: http://www.ehs.colostate.edu/WWorkComp/Home.aspx

• First Report of Injury must be INITIATED as soon as possible
  – Online link: required forms: https://wsnet.colostate.edu/cwis86/EHslogin/default.aspx?From=WorkComp

• Medical attention must be sought by a CSU Authorized Treating Physician
  – For a complete list of CSU Authorized Treating Physicians:
    http://www.ehs.colostate.edu/WWorkComp/HealthContPrint.aspx

• All claims are subject to review and may not be covered under Workers Compensation unless found compensable under current Worker’s Compensation Statutes.
  – **GO TO A CSU AUTHORIZED TREATING PHYSICIAN WHENEVER POSSIBLE** as initial visit costs will be covered through Workers Compensation even if it is determined that your illness is not work related. If you must go to the ER or an Urgent Care provider for the specific reasons listed above, you and/or your insurance carrier will be responsible for all health care costs for illnesses/injuries that are NOT related to your employment.
  – **However**, in order to assure that medical attention is sought appropriately for potentially work related illnesses, CSU may cover certain out of pocket costs for ER or Urgent Care services that are NOT covered under Colorado Workers’ Compensation Statutes (provided that the requirements of this procedure have been properly followed). In general, such coverage will not exceed $2,000.

• CSU Workers’ Compensation Website: http://www.ehs.colostate.edu/WWorkComp/Home.aspx
When to go to a CSU Authorized Treating Physician

- During regular business hours
  - When you **have a fever**, and you have been in the **BSL-3 barrier in the last 5 days**
  - When you have a **KNOWN exposure** to or an injury **INvolving TUBERCULOSIS**
  - When you have a minor injury

- When told by the ER, Urgent Care, or Workers’ Compensation to follow up after an Emergency Room or Urgent Care visit

- Due to limitations in Workers’ Compensation coverage for ER or Urgent Care visits, see a CSU Designated Care Provider whenever possible.
  - For details see Workers’ Compensation Procedure in this packet, or “BSL3 Illness Procedures” online at [http://www.ehs.colostate.edu/WBiosafety/Home.aspx](http://www.ehs.colostate.edu/WBiosafety/Home.aspx) under the bar labeled “BSL3 Illness Procedures, Info, and Emergency Response Packets”.
CSU AUTHORIZED TREATING PHYSICIANS

For NON-EMERGENCY incidents

If you go to the Emergency Room, follow-up with one of these providers

A complete list of designated providers can be found at:
http://www.ehs.colostate.edu/WWorkComp/HealthContPrint.aspx
University of Colorado Health Occupational Health Services
4674 Snow Mesa Drive, Suite 200
Fort Collins, CO
(970) 495-8450
Mon-Fri, 7:00am - 6:00pm

FROM Foothills Campus:
• Right on Overland trail
• Left on W. Prospect Rd
• Left on S. College Ave.
• Left on Harmony Rd.
• Right on Snow Mesa Dr
• Occ Health is on 2nd floor, Suite 200
Approximate drive time is 20 minutes.

FROM Main and South Campuses:
• South on College Ave.
• Left on Harmony Rd.
• Right on Snow Mesa Dr
• Occupational Health Services is on 2nd floor, Suite 200
Approximate drive time is 15 minutes.
**Workwell Fort Collins**
1600 Specht Point Road, Suite 115
Fort Collins, CO
(970) 672-5100
Mon- Fri, 8:00am - 5:00pm

**Workwell Loveland**
1608 Topaz Drive
Loveland, CO
(970) 593-0125
Mon-Fri, 8:00am - 5:00pm

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**FROM FOOTHILLS CAMPUS to Workwell, Fort Collins**
- Turn Right on Overland Trail.
- Turn Left on W. Prospect Road.
- Turn Right at Specht Point Drive.
- Workwell is located on the first floor.

Approximate drive time is 15 minutes.

**FROM MAIN AND SOUTH CAMPUSSES to Workwell, Fort Collins**
- Head East on Prospect Road.
- Turn Right at Specht Point Drive.
- Workwell is located on the first floor.

Approximate drive time is 15 minutes.
When to go to the Emergency Room

• When you have a KNOWN EXPOSURE to a BSL-3 infectious agent (other than Tuberculosis)

• When you have a major injury

• WHEN A CSU AUTHORIZED TREATING PROVIDER IS CLOSED and you have a fever within 5 days of being in the BSL-3 barrier and/or have symptoms associated with disease due to pathogens worked with.
  – IF YOU GO TO THE EMERGENCY ROOM OR URGENT CARE AND ARE DIRECTED TO DO SO, YOU MUST FOLLOW UP WITH ONE OF THE CSU AUTHORIZED TREATING PHYSICIAN THE NEXT BUSINESS DAY.

• Complete list: http://www.ews.colostate.edu/WorkComp/Home.aspx

• If you go to the Emergency Room or Urgent Care, it is your responsibility to follow up by providing them with your Workers’ Compensation claim number and billing information:
  P.O. Box 4998
  Greenwood Village, CO 80155
  Phone: (303) 804-2000
  Fax: (303) 804-2005
  Toll-Free: (888) 428-4671
Emergency Room Directions

Please do not drive yourself. Have someone take you. Contact Biosafety if you need a ride. 491-0270
**EMERGENCY ROOM NEAREST TO CSU**

Go to Emergency Room closest to you

Poudre Valley Hospital
Emergency Dept (Colorado Health Medical Group)
1024 South Lemay Ave
Fort Collins, CO
(970) 495-7000
24 hours, 7 days per week

FROM FOOTHILLS CAMPUS
- Turn Left on Overland Trail
- Turn Right on W. Mulberry Street
- Turn Right on Riverside Avenue
- Turn Right at S. Lemay Avenue
- Hospital is on the East side of the road.

Approximate drive time is 15 minutes.

FROM MAIN AND SOUTH CAMPUSES
- Head East on Prospect or Drake
- Turn Left at Lemay Avenue
- Hospital is on the East side of the road.

Approximate drive time is 10 minutes.
Poudre Valley Hospital Harmony

URGENT CARE

Go to an Urgent Care closest to you

FROM FOOTHILLS CAMPUS

• Turn Left on Overland Trail
• Turn Right on Mulberry Ave
• Turn Right on Riverside Ave
• Turn Left on E. Prospect Rd
• Turn Right on Timberline Rd
• Turn Left on E. Harmony Rd
• Facility is on the South side of Harmony Road
• Follow signs to Urgent Care

Approximate drive time is 21 minutes

FROM MAIN AND SOUTH CAMPUSES

• Head East on Prospect Rd
• Turn Right on Timberline Rd
• Turn Left on E. Harmony Rd
• Facility is on the South side of Harmony Road
• Follow signs to Urgent Care

Approximate drive time is 20 minutes

PVHs Harmony Urgent Care
2127 E. Harmony Road
Daily, 8 a.m. to 8 p.m.
(970) 297-6250
# Biosafety Incident Report Form

*This is not a Workers’ Compensation Incident Report Form*

If this is an injury, have you filled out a workers’ compensation form? □ Yes □ No

<table>
<thead>
<tr>
<th>Personal Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>CSU ID:</td>
</tr>
<tr>
<td>First Name:</td>
<td>Last Name:</td>
</tr>
<tr>
<td>Email:</td>
<td>Phone Number:</td>
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<tr>
<td>Alt. Phone Number:</td>
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</table>

<table>
<thead>
<tr>
<th>Emergency Contact Information</th>
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<tbody>
<tr>
<td>Name:</td>
<td>Phone #:</td>
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<tr>
<td>Name:</td>
<td>Phone #:</td>
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<table>
<thead>
<tr>
<th>Incident Information</th>
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<tbody>
<tr>
<td>Pathogen working with:</td>
<td></td>
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<tr>
<td>Does the pathogen contain recombinant DNA or synthetic nucleic acid molecules? □ Yes □ No</td>
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<tr>
<td>Location (building, room):</td>
<td>Time of Incident:</td>
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<tr>
<td>Incident Type (exposure, physical injury, etc.):</td>
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<tr>
<td>Incident Description (Provide as much detail as possible and list external events that may have contributed to the incident):</td>
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### Method and Location of Injury (check all that apply):

<table>
<thead>
<tr>
<th>Method</th>
<th>Location</th>
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<tbody>
<tr>
<td>☐ Needlestick</td>
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<tr>
<td>☐ Blood or body fluids</td>
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<tr>
<td>☐ Spill</td>
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<tr>
<td>☐ Aerosol</td>
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<tr>
<td>☐ Animal Bite/Scratch</td>
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<tr>
<td>☐ Necropsy</td>
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<tr>
<td>☐ Broken glass</td>
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<tr>
<td>☐ Sharps Container</td>
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<tr>
<td>☐ Other (describe)</td>
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### Action(s) taken to control incident (e.g. hand washing, spill clean-up, etc.):

<table>
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<tr>
<th>Action(s) taken to control incident</th>
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### Personal Protective Equipment (PPE) Worn at time of Injury

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<thead>
<tr>
<th>PPE Worn at time of Injury</th>
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<tbody>
<tr>
<td>☐ Scrubs</td>
<td>☐ Tyvek</td>
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<tr>
<td>☐ Surgical gown</td>
<td>☐ PAPR</td>
</tr>
<tr>
<td>☐ N-95 respirator mask</td>
<td>☐ Face Shield</td>
</tr>
<tr>
<td>☐ Gloves</td>
<td>☐ Goggles</td>
</tr>
<tr>
<td>☐ Hair Cover</td>
<td>☐ Shoes</td>
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</table>

### Was there a PPE failure?

If yes, explain:

<table>
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<tr>
<th>If yes, explain:</th>
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Print or scan and send to the Biosafety Office: 6021 Campus Delivery, 141 General Services Building, Fort Collins, CO 80523; E-mail scanned copies to Heather.Blair@colorado.edu, or Joni.Triantis@colorado.edu
Bacillus anthracis

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CONTAINMENT AND SPECIAL PRECAUTIONS

Containment
- BSL-3 and ABSL-3 Level practices, containment equipment and facilities are required for work involving propagation of the organism, any activity with potential for aerosol production and infection of animals.
- BSL2 practices and containment equipment are recommended for activities using clinical materials and diagnostic cultures

Special Considerations:
- Select Agent, Tier 1

HAZARD IDENTIFICATION

Disease: Anthrax, woolsorters’ disease

Transmission: skin contact with infected animal tissue, biting flies, contaminated hair, wool, hides or other hide products, inhalation of spores, ingestion of undercooked meat.

Communicability: Person to person transmission is extremely rare, occurring with contact of exudates from cutaneous forms of anthrax.

Incubation: within 7 days

Infectious Dose: 8,000 to 50,000 organisms by inhalation

VIABILITY/INACTIVATION

Stability: Spores remain viable in soil, skins/hides, milk, dried surfaces for years; spores survive in pond water for 2 years

Inactivation:
- Incineration and autoclave sensitive
- Spores are resistant to many disinfectants. Susceptible 10-12% bleach at pH close but not exceeding 7 (Add 1 part bleach, to 8 parts water, mix, and add one part white vinegar); 25.8% Hydrogen peroxide, 24 C, 15 minutes; 2% glutaraldehyde formaldehyde and 5% formalin (overnight soak). 10% NaOH or 0.5% bleach can be used for animal stockyards, pens and related farm equipment.

MEDICAL

Signs and Symptoms:
- Cutaneous: Skin lesions becoming papular (bump with no visible fluid), then vesiculated (fluid filled), and depressed, black scab (eschar)
- Inhalation: Respiratory distress, fever and shock with death shortly after
- Intestinal: Abdominal distress followed by fever, septicemia and death (rare)
Pre-exposure Prophylaxis:
- Vaccine available, however, is only indicated when exposure risk is high: 5 shots intermuscular given at day 0, week 4, months 6, 12 and 18 months

Medical Surveillance:
- Before working with or around this agent, individuals must enroll in CSU’s medical surveillance program through the CSU Occupational Health Program.

Diagnosis:
- Serum will be tested for antibody at day 0 and day 7-14 (or 14-35 days after symptoms occur)
- Dependent on type of specimen, mostly direct culture and PCR.

Treatment:
- **Post-exposure prophylaxis:** 3 doses of vaccine plus 60 days of antibiotics. Vaccine dose given as 0.5 ml subcutaneously at 0, 2, and 4 weeks after exposure. Duration of antibiotic treatment should be at least 30 days after administration of third dose of vaccine: ciprofloxacin, 500 mg orally every 12 hours; or doxycycline, 100 mg orally every 12 hours.
- **Treatment of Symptomatic Cases:** Treatment of inhalational anthrax should include ciprofloxacin (400 mg IV every 12 hours), or doxycycline (200 mg IV loading dose, followed by 100 mg IV every 12 hours for adults), in addition to additional drugs

**WHAT TO DO IF AN EXPOSURE OCCURS**

**Employees, Graduate Students, Work Study**
1. Employee notifies Biosafety (970-491-0270) and/or Occupational Health Program Coordinator (970-420-8172) to inform where medical attention will be sought and if transportation is needed
   - The Principal Investigator/Supervisor must also be notified
2. Employee goes to Emergency Room
3. After the Emergency Room visit, individual fills out the following forms:
   - Biosafety Incident report form:  
     [http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf](http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf)
   - Workers’ Compensation (within 4 days or as soon as possible):
     [http://www.ehs.colostate.edu/WWorkComp/Home.aspx](http://www.ehs.colostate.edu/WWorkComp/Home.aspx)
4. Employee follows up with CSU Authorized Treating Physician

**Student Not Paid by CSU**
1. Contact supervisor/PI
2. Student or supervisor contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to arrange transportation if needed
3. Student goes to CSU Health Network (formerly Hartshorn Health Services)
4. After the visit to CSU Health Network, student fills out Biosafety Incident Report form
   [http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf](http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf)

**Volunteers and Visitors**
1. Contact supervisor/PI
2. Contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to arrange transportation if needed
3. Individual goes to their personal physician, or as otherwise directed by their physician
4. Individual fills out Biosafety Incident Report form
   [http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf](http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf)
REFERENCES

- Disinfection, EPA: http://www.epa.gov/pesticides/factsheets/chemicals/bleachfactsheet.htm
- Iowa State University Technical Data Sheet: http://www.cfsph.iastate.edu/Factsheets/pdfs/anthrax.pdf

CONTENT REVIEW

This document has been reviewed by:

- CSU subject matter expert: Dr. Richard Bowen
- Licensed Physicians: Occupational Health Services (principal: Dr. Tracy Stefanon)
**Brucella spp. (B. abortus, B. melitensis, B. suis, B. canis)**

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**CONTAINMENT AND SPECIAL PRECAUTIONS**

**Containment:**
- BSL-3 level practices, containment equipment, and facilities for manipulations of cultures and experimental studies using animals.
- BSL-2 level practices, containment equipment and facilities for manipulations of clinical specimens.

**Special Considerations:**
- Select Agent

**HAZARD IDENTIFICATION**

**Disease:** Brucellosis, Undulant fever

**Transmission:** ingestion, direct contact of mucous membranes and broken skin with infected material, inhalation, contact with vaccine strain for cattle RB51 (accidental injection)

**Communicability:** Person to person spread is extremely rare, occurring through sexual contact or ingestion of infected breastmilk.

**Incubation:** variable, 5-60 days, stable in the environment

**Infectious Dose:** 10 to 100 by inhalation

**VIABILITY/INACTIVATION**

**Stability:** Survives for up to 28 days at room temperature on glass and aluminum and without UV light and 7 days on concrete. Survives in carcasses and organs for up to 135 days, and blood stored at 4 C for 180 days

**Inactivation:**
- Autoclave sensitive
- 1%-2.5% bleach (500 -1,250 ppm available sodium hypochlorite), 70% ethanol, susceptible to most commonly available disinfectants

**MEDICAL**

**Signs and Symptoms:**
Note that there have been very few documented human cases of infection with B. canis

**Systemic disease:**
- Intermittent fever
- Headache
- Weakness
- Profuse sweating

**Chills**
- Arthralgia (joint pain)
- Localized suppurative (discharge or pus) infections
Diagnosis:
Serological testing microagglutination testing at day 0 and at week 2, 4, 6 and 24

Pre-exposure Prophylaxis:
None

Treatment:
- Post-exposure Prophylaxis and Treatment of Symptomatic Cases:
  - Antibiotic therapy, doxycycline (100mg) and rifampin (600mg) in combination for 21 days
  - Exposure to the RB51 (vaccine) strain does not require rifampin
  - For individuals with problems with doxycycline, trimethoprim-sulfamethoxazole can be used

WHAT TO DO IF AN EXPOSURE OCCURS

Employees, Graduate Students, Work Study
1. Employee notifies Biosafety (970-491-0270) and/or Occupational Health Program Coordinator (970-420-8172) to inform where medical attention will be sought and if transportation is needed
   - The Principal Investigator/Supervisor must also be notified
2. Employee goes to Emergency Room
3. After the Emergency Room visit, individual fills out the following forms:
   - Biosafety Incident report form:
     http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf
   - Workers’ Compensation (within 4 days or as soon as possible):
     http://www.ehs.colostate.edu/WWorkComp/Home.aspx
4. Employee follows up with CSU Authorized Treating Physician

Student Not Paid by CSU
1. Contact supervisor/PI
2. Student or supervisor contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to arrange transportation if needed
3. Student goes to CSU Health Network (formerly Hartshorn Health Services)
4. After the visit to CSU Health Network, student fills out Biosafety Incident Report form
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Volunteers and Visitors
1. Contact supervisor/PI
2. Contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to arrange transportation if needed
3. Individual goes to their personal physician, or as otherwise directed by their physician
4. Individual fills out Biosafety Incident Report form
   http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf

REFERENCES
- CDC Clinician Guide: http://www.cdc.gov/brucellosis/clinicians/index.html
- CDC Information on Transmission: http://www.cdc.gov/brucellosis/transmission/index.html
- CDC Summary: http://emergency.cdc.gov/coca/summaries/pdf/08_25_11_Transcript_FIN.pdf
Iowa State University Technical Data Sheet: http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis.pdf
Iowa State University Technical Data Sheet, Brucella abortus: http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis_abortus.pdf
Iowa State University Technical Data Sheet, Brucella canis: http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis_canis.pdf
Iowa State University Technical Data Sheet, Brucella melitensis: http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis_melitensis.pdf
Iowa State University Technical Data Sheet, Brucella ovis: http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis_avis.pdf
Iowa State University Technical Data Sheet, Brucella suis: http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis_suis.pdf

CONTENT REVIEW
This document has been reviewed by:

- CSU subject matter expert: Dr. Richard Bowen
Coxiella burnetii

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CONTAINMENT AND SPECIAL PRECAUTIONS

Containment
- BSL-3 level practices, containment equipment, and facilities are required for work involving infectious body fluids, tissues, animals and cultures.

Special considerations:
- Select Agent
- Health care personnel PPE should include masks and eye protection when generation of aerosols or splatters of body fluids are anticipated.
- Health Risk factors: Persons with valvular heart disease, prosthetic heart valves, liver disease, altered immune systems and pregnant individuals are at increased risk for developing Q fever or complications.

HAZARD IDENTIFICATION

Disease: Q fever

Transmission: inhalation of infective animal body fluids (urine, milk, blood, and birthing fluids); arthropods (ticks). Person to person transmission is rare. While there is not a risk of secondary contamination or reaerosolization of the organisms from patients exposed to aerosolized C. burnetti, contaminated clothing may be a source of infection.

Communicability: While rare, person to person transmission has been reported in hospital workers as well as contact families.

Incubation: 10-40 days; varies

Infectious dose: 10-50 cfu by inhalation and percutaneous

VIABILITY/INACTIVATION

Stability: Spore-like form is resistant to heat, drying and sunlight and fomites contaminated by blood, urine, feces, and birth fluids can remain infectious for long periods.

Inactivation:
- Autoclave sensitive
- 1% Sodium hypochlorite, 5% Peroxide, , 70% Ethanol (30 minutes), 2% glutaraldehyde, formaldehyde
- Zoonotic
- Can cause abortion and premature labor
- People with recent heart surgery should avoid contact with agent
MEDICAL

Signs and symptoms:
Commonly presents as self-limited febrile illness of 2-14 days of duration. Can also cause chronic infections such as endocarditis or granulomatous hepatitis.

- High Fever
- Flu-like symptoms
- Abdominal pain
- Severe sweats
- Weakness
- Severe headache
- Pneumonitis (no cough or chest pain)
- Hepatitis
- Osteomyelitis
- Arthritis
- Endocarditis
- Neurological signs- confusion

Pre-exposure prophylaxis:
Vaccine (Q-Vax) may be available but requires sensitivity testing and travel to Australia.

Diagnosis:
- Serological tests include: immunofluorescence, microagglutination, complement fixation and ELISA
- PCR can detect organism in blood, cerebrospinal fluid, tissues and milk.
- Serum taken: Day of exposure, and 14 - 21 days post infection to detect 4-fold rise in titer

Treatment
- **Post exposure prophylaxis:**
  - Doxycycline, 100 mg, orally, every 12 hours, or tetracycline, 500 mg, orally every 6 hours following moderate to high risk exposure.
- **Symptomatic Treatment:** Should be started within first 3 days:
  - 100 mg Doxycycline, orally, twice daily for 15-21 days
  - Chronic stage – Doxycycline and quinolones for 4 years, or Doxycycline and hydroxychloroquine for 1 ½ to 3 years.

WHAT TO DO IF AN EXPOSURE OCCURS

Employees, Graduate Students, Work Study
1. Employee notifies Biosafety (970-491-0270) and/or Occupational Health Program Coordinator (970-420-8172) to inform where medical attention will be sought and if transportation is needed
   - The Principal Investigator/Supervisor must also be notified
2. Employee goes to Emergency Room
3. After the Emergency Room visit, individual fills out the following forms:
   - Workers’ Compensation (within 4 days or as soon as possible): [http://www.ehs.colostate.edu/WWorkComp/Home.aspx](http://www.ehs.colostate.edu/WWorkComp/Home.aspx)
4. Employee follows up with CSU Authorized Treating Physician

Student Not Paid by CSU
1. Contact supervisor/PI
2. Student or supervisor contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to arrange transportation if needed
3. Student goes to CSU Health Network (formerly Hartshorn Health Services)
4. After the visit to CSU Health Network, student fills out Biosafety Incident Report form
   http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf

Volunteers and Visitors
1. Contact supervisor/PI
2. Contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to
   arrange transportation if needed
3. Individual goes to their personal physician, or as otherwise directed by their physician
4. Individual fills out Biosafety Incident Report form
   http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf

REFERENCES
- CDC Prophylaxis after Exposure:  http://wwwnc.cdc.gov/eid/article/14/10/08-0576_article.htm
- Iowa State University Technical Data Sheet:  http://www.cfsph.iastate.edu/Factsheets/pdfs/q_fever.pdf
- Moodie CE, Thompson HA, Meltzer MI, Swerdlow DL. Prophylaxis after exposure to Coxiella burnetii. Emerg Infect Dis [serial
  on the Internet]. 2008 Oct [date cited]. (http://www.cdc.gov/EID/content/14/10/1558.htm)
  Biosafety, 11(1), 32-41.

CONTENT REVIEW
This document has been reviewed by:
- CSU subject matter expert: Dr. Richard Bowen
Francisella tularensis

Principal investigators are responsible for communicating this information to staff working with or around this agent, and for mitigation of associated risks. This document is not intended to be used as a sole source for diagnosis, medical treatment, or medical advice. Consult a CSU Authorized Treating Physician for concerns about work related medical conditions.

CONTAINMENT AND SPECIAL PRECAUTIONS

Containment
- BSL-3 Level practices, containment equipment and facilities are required for work involving viable cultures, infected experimental animals and for activities with a high potential for aerosol production.
- BSL2 practices and containment equipment are recommended for activities using inactivated clinical materials.

Special Considerations:
- Select Agent, Tier 1

HAZARD IDENTIFICATION

Disease: Tularemia

Transmission: arthropods (ticks, deer fly, mosquito), infected rabbits, hamsters and other rodents, inhalation, contact with infected animal tissue, blood and urine; contaminated food and water

Communicability: Person to person transmission has NOT been documented

Incubation: 1-14 days, clinical symptoms 3-5 days post infection

Infectious dose: VERY LOW 10-50 cfu by inhalation or percutaneous inoculation

VIABILITY/INACTIVATION

Stability: Can survive in carcasses and organs for up to 133 days, and in straw and animal bedding for 192 days. Survives in water for 90 days.

Inactivation:
- Autoclave sensitive
- 1% Sodium hypochlorite, 70% Ethanol, 2% glutaraldehyde, Formaldehyde
- Can withstand freezing for months to years

MEDICAL

Signs and symptoms:
There are six forms of tularemia in humans, depending on the inoculation site (lastate.edu):
- Tularemia can be fatal if not treated with the appropriate antibiotics.
- Ulceroglandular (when infection occurs through the skin or mucous membranes)
  - Initial flu-like symptoms: fever, chills, headache, body aches, malaise
  - Inflamed and ulcerated lesion at site of entry
  - Enlarged and painful regional lymph nodes
- Glandular (When infection occurs through the skin or mucous membranes)
Identical to Ulceroglandular, but without the lesion

- **Oculoglandular (when infection occurs through the eyes)**
  - Fever
  - Painful and purulent conjunctivitis
  - Swelling of lymph nodes in front of the ear
  - Sometimes nodules or ulcerations on the conjunctiva

- **Oropharyngeal (infection through eating or drinking)**
  - Fever, malaise
  - Exudative stomatitis (oozing inflammation of the mouth)
  - Sore throat with pustules and ulcers
  - Inflamed tonsils
  - Swelling of lymph nodes in the neck
  - Vomiting
  - Diarrhea

- **Pneumonic (infection through inhalation)**
  - Acute form of tularemia
  - Non-specific symptoms: fever, chills, malaise
  - Coughing, chest pain, dyspnea (difficulty breathing)
  - Sometimes nausea and vomiting
  - May follow other forms of tularemia that are left untreated, when the bacteria spread through the bloodstream to the lungs
  - Occasionally no overt signs of pneumonia

- **Typhoidal (infection route may not be apparent)**
  - Acute form of tularemia
  - Septicemia
  - Fever, chills, malaise
  - Usually lymph nodes NOT enlarged
  - Usually NO ulcers
  - Delirium, shock
  - Mortality rate: 30-60%

Pre-exposure prophylaxis:

NONE – no vaccine currently approved for use in the US (Currently under review by FDA, but not available)

Medical Surveillance:

- Before working with or around this agent, individuals must enroll in CSU’s medical surveillance program through the CSU Occupational Health Program.

Diagnosis:

Serological tests include: tube agglutination, microagglutination, and ELISA

Serum taken: Day of exposure, and 14 days post infection to detect 4-fold rise in titer (cross reaction with Brucella, Proteus and Yersinia species.)
Isolation of baceteria from blood, sputum, pharyngeal or conjunctival exudates, ulcers, lymph nodes and gastric washings grown on blood-enriched media, including cysteine glucose blood agar, cysteine heart agar supplemented with 9% heated sheep red blood cells (CHAB), buffered charcoal yeast extract agar, modified Thayer Martin media. Sheep blood agar, chocolate agar, and Thayer-Martin may be used for initial isolation of bacteria, but CDC recommends CHAB media once presence of *F. tularensis* is confirmed.

**Treatment:**

- **Post Exposure Prophylaxis:**
  - Should be started within 24 hours and continued for at least 14 days
  - Streptomycin 1mg IM 2x/day
  - Gentamycin 5 mg/kg IM or IV 1x/day for 10 days
  - Doxycycline 100 mg 2x/day for 14 days
  - Ciprofloxacin 500 mg 2x/day for 10-14 days

- **Symptomatic Treatments:**
  - Streptomycin (7.5 to 10 mg/kg every 12 hours for 10 to 14 days, not to exceed 1 g IM twice daily)
  - Doxycycline (100 mg IV twice daily for 14 to 21 days)
  - Ciprofloxacin (400 mg IV twice daily for 14 to 21 days, switching to oral 750 mg every 12 hours after clinical improvement),

**WHAT TO DO IF AN EXPOSURE OCCURS**

**Employees, Graduate Students, Work Study**

1. Employee notifies Biosafety (970-491-0270) and/or Occupational Health Program Coordinator (970-420-8172) to inform where medical attention will be sought and if transportation is needed
   - The Principal Investigator/Supervisor must also be notified
2. Employee goes to Emergency Room
3. After the Emergency Room visit, individual fills out the following forms:
   - Workers’ Compensation (within 4 days or as soon as possible): [http://www.ehs.colostate.edu/WWorkComp/Home.aspx](http://www.ehs.colostate.edu/WWorkComp/Home.aspx)
4. Employee follows up with CSU Authorized Treating Physician

**Student not paid by CSU**

1. Contact supervisor/PI
2. Student or supervisor contact Biosafety 491-0270 (491-0270) or Occupational Health (420-8172) to report, to inform where attention is being sought, and to arrange transportation if needed
3. Student goes to CSU Health Network (Formerly Hartshorn Health Services)

**Volunteers and visitors**

1. Contact supervisor/PI
2. Contact Biosafety (491-0270) or Occupational Health (420-8172) to report, to inform where attention is being sought, and to arrange transportation if needed.
3. Individual goes to their personal physician, or as otherwise directed by their physician
REFERENCES

- Iowa State University Technical Data Sheet: [http://www.cfsph.iastate.edu/Factsheets/pdfs/tularemia.pdf](http://www.cfsph.iastate.edu/Factsheets/pdfs/tularemia.pdf)

CONTENT REVIEW

This document has been reviewed by:

- CSU subject matter experts: Drs. Richard Slayden and Claudia Gentry-Weeks
- Licensed Physicians: Occupational Health Services (principal: Dr. Tracy Stefanon)
 Importance

Newcastle disease is a viral disease of birds with a wide range of clinical signs from mild to severe. This disease is caused by a diverse group of viruses; the milder strains are endemic in the United States, while highly virulent strains are exotic. The highly virulent form of Newcastle disease is one of the most important poultry diseases worldwide. Chickens are particularly susceptible, and may experience morbidity and mortality rates up to 100%. Outbreaks of virulent Newcastle disease have a tremendous impact on backyard chickens in developing countries, where these birds are a significant source of protein and this disease is endemic. In developed countries, where the more virulent forms of the virus have been eradicated, trade embargoes and restrictions cause significant economic losses during outbreaks. In the United States, one epidemic in 2002-2003 resulted in the death of more than three million birds and caused industry losses estimated at $5 billion. Low pathogenicity isolates, which are common in poultry worldwide, can decrease productivity but have no impact on international trade.

Although the most significant impact of Newcastle disease is on chickens, other species can also be affected. Some pet and zoo birds become ill after infection, while other species can carry and shed virulent viruses asymptomatically. These birds, particularly illegally imported psittacines, can introduce Newcastle disease viruses to disease-free countries. Newcastle disease is also an important cause of death during the first three months of life in cormorant colonies. Since the late 1990s, novel strains have caused outbreaks among geese (a species that is usually resistant to disease) in China.

 Etiology

Newcastle disease is caused by viruses in the serotype avian paramyxovirus type 1 (APMV-1). These viruses, which are called either APMV-1 or Newcastle disease viruses (NDV), are members of the genus *Avulavirus* in the family Paramyxoviridae. APMV-1 strains maintained in pigeon populations have some antigenic differences from other NDV isolates, and are sometimes called pigeon paramyxovirus type 1 (PPMV-1).

APMV-1 strains are classified into three pathotypes based on their virulence in chickens. Lentogenic strains are the least virulent, mesogenic strains are moderately virulent, and velogenic strains are the most virulent. Most strains cluster toward the two extremes of virulence, and are either lentogenic or velogenic. Velogenic viruses can be subdivided into a neurotropic form, which is typically associated with respiratory and neurologic signs, and a viscerotropic form with hemorrhagic intestinal lesions. These clinical forms overlap and are rarely clear-cut, even in specific pathogen free (SPF) chickens.

Several tests can be used to assess the virulence of an APMV-1 strain, and countries may use different criteria to define Newcastle disease. The OIE defines Newcastle disease as an infection caused by a highly virulent APMV-1 virus – an isolate that has either 1) an intracerebral pathogenicity index (ICPI) of at least 0.7 in day-old chicks, or 2) an amino acid sequence that resembles those seen in highly virulent viruses (multiple basic amino acids at the C-terminus of the F2 protein and phenylalanine at residue 117 of the F1 protein). Such viruses must be reported to the OIE and have severe repercussions for international trade. The U.S. defines “exotic Newcastle disease” (END) as the disease caused by velogenic viscerotropic strains.

APMV-1 isolates can also be separated into two clades, called class I and class II, based on the genetic relationship between viruses. The vast majority of APMV-1 strains belong to class II, which is divided into at least nine genotypes (I to IX). Class I isolates have been found mainly in wild waterfowl, and are usually of low pathogenicity.

 Species Affected

Newcastle disease primarily affects birds. Some avian species become ill, while others carry these viruses asymptomatically. Infections also occur in humans, but have not been reported in other species of mammals.
APMV-1 viruses are known to infect more than 250 species of birds in 27 orders; other avian species may also be susceptible. Wild birds, particularly waterfowl (order Anseriformes), tend to carry these viruses asymptomatically. Most of the viruses found in wild birds are lentogenic; however, virulent APMV-1 has become established in some cormorant populations (Phalacrocorax sp.; order Pelecaniformes) and causes disease in juvenile birds. Susceptibility to illness varies widely among poultry and pet birds. Members of the order Phasianiformes (gallinaceous birds), particularly chickens, are highly susceptible to disease. Turkeys are less likely to develop severe symptoms, and the susceptibility of game birds (pheasants, partridges, quail and guinea fowl) varies with the species. Ducks and geese usually have no apparent infections, but some isolates (in genotypes VII and VI) have caused outbreaks among geese in China since the 1990s. Clinical cases have been also been described occasionally in ducks. Outbreaks have been reported in ostriches (order Struthioniformes). Pigeons (order Columbiformes) are susceptible to disease, and lentogenic or mesogenic APMV-1 viruses (PMMV-1) are endemic in pigeon populations. Susceptibility to disease varies widely in psittacine birds (order Psittaciformes); cockatiels often die or develop neurological signs, but some species tend to carry velogenic viruses subclinically. Some birds found in the wild or in zoos also become ill. Penguins (order Sphenisciformes) are highly susceptible to Newcastle disease, and birds often die acutely. Fatal or severe disease has been reported in some raptors (order Falconiformes) including a bearded vulture (Gypaetus barbatus), some species of falcons, a captive white-tailed sea eagle (Haliaeetus albicilla) and a wild osprey (Pandion haliaetus). Other raptors tend to be resistant to disease. Illness has also been reported in gulls (order Charadriiformes) owls (order Strigiformes) pelicans (order Pelecaniformes) and a Northern gannet (Morus bassanus; order Pelecaniformes). Susceptibility varies among passerine birds (order Passeriformes), with some species excreting virus subclinically and others developing severe clinical signs. Occasional deaths have also been reported in Corvidae (crows and ravens).

Geographic Distribution

Velogenic APMV-1 is endemic in Asia, the Middle East, Africa, Central and South America, and parts of Mexico. Virulent strains are endemic in wild cormorants in the U.S. and Canada, but commercial poultry are free of velogenic isolates. Lentogenic isolates are found in poultry throughout the world, including the U.S. Mesogenic strains may also be found, but are less common.

Transmission

APMV-1 can be transmitted by inhalation or ingestion (fecal/oral route). Birds shed virus in both feces and respiratory secretions. Gallinaceous birds excrete APMV-1 for only 1 to 2 weeks, but psittacine birds often shed these viruses for several months. Some species of psittacine birds can excrete virus for more than a year. Prolonged shedding has also been reported in some members of other orders, including owls (more than four months) and cormorants (one month). Shedding can be sporadic. APMV-1 is present in all parts of the carcass, and some outbreaks in raptors have been linked to eating infected chicken, pigeon or quails. When the temperature is just above freezing (1-2°C [34-35°F]), this virus is reported to survive on chicken skin for up to 160 days and in bone marrow for nearly 200 days. The importance of aerosols in long distance transmission is controversial. In one study, APMV-1 was found 64 meters but not 165 meters downwind of an infected farm. The survival of aerosolized virus is probably dependent on humidity and other environmental factors, as well as the concentration of infected poultry. Some isolates can be transmitted through the egg to hatching chicks. Egg-associated transmission of highly virulent isolates is possible but uncommon, as the embryo usually dies unless the viral titer in the egg is low. Other sources of virus for newly hatched chicks are feces-contaminated eggshells and cracked or broken eggs.

APMV-1 is readily transmitted on fomites. Survival is prolonged on eggshells and especially in feces, compared to an inorganic surface (filter paper). Published information on virus survival is highly variable, probably because it is affected by the humidity, temperature, suspending agent and exposure to light. One study reported that APMV-1 survived in contaminated, uncleaned poultry houses for up to 7 days in summer, as long as 14 days in the spring, and 30 days during the winter. Another group reported virus isolation up to 16 days after depopulation of an unvaccinated flock. However, one study found that APMV-1 remained viable for up to 255 days in a henhouse, at ambient temperatures of −11°F (−23°C) to 36°F (9°C). At 23-29°C (73-84°F), APMV-1 is reported to survive in contaminated litter for 10 to 14 days, and at 20°C (68°F) in soil for 22 days. Virus has also been recovered from earthworms for 4 to 18 days, and from experimentally contaminated lake water for 11 to 19 days. Flies might be able to transmit APMV-1 mechanically, but it is still uncertain whether insects can carry enough virus to infect poultry. The importance of arthropod-borne transmission may vary with the type of housing and flock management.

The epidemiology of APMV-1 is incompletely understood; however, wild birds, particularly waterfowl, may be the reservoir hosts for lentogenic viruses. These viruses could become more virulent after becoming established in poultry. Some recent outbreaks were apparently caused by velogenic viruses that emerged from local, low pathogenic isolates. Acquisition of virulence has also been reported in experimentally infected birds. Psittacine birds have introduced APMV-1 to poultry flocks in some outbreaks. Although early reports suggested that
virulent strains might be endemic in wild psittacine populations, these birds are now thought to become infected after capture. Cormorants could transmit velogenic viruses to poultry; gulls associated with cormorant colonies could also be a source of virus, and are more likely to visit farms. Lentogenic or mesogenic APMV-1 viruses are endemic in pigeon populations, and can become more virulent if they enter and cycle in poultry flocks.

**Incubation period**

The incubation period in poultry varies from 2 to 15 days depending on the virulence of the strain and the susceptibility of the population. In chickens infected with velogenic isolates, an incubation period of 2 to 6 days is common. Incubation periods up to 25 days have been reported in some avian species.

**Clinical signs**

The clinical signs vary with the pathogenicity of the isolate and the species of bird. In chickens, lentogenic strains usually cause subclinical infections or mild respiratory disease with coughing, gasping, sneezing and rales. Mesogenic strains can cause acute respiratory disease and neurologic signs in some chickens, but the mortality rate is usually low. Lentogenic or mesogenic strains can produce more severe symptoms if the flock is co-infected with other pathogens.

Velogenic strains cause severe, often fatal, disease in chickens. The clinical signs are highly variable. Most birds are lethargic and inappetent, and the feathers may be ruffled. Conjunctival reddening and edema may be an early sign. Some birds develop watery, greenish or white diarrhea, respiratory signs (including cyanosis) or swelling of the tissues of the head and neck. Neurologic signs including tremors, clonic spasms, paresis or paralysis of the wings and/or legs, torticollis (twisted neck) and circling may also be seen. Nervous signs can occur concurrently with other symptoms but are generally seen later in the course of disease. Egg laying often declines dramatically, and eggs may be misshapen, abnormally colored, and rough or thin-shelled, with watery albumen. Sudden death, with few or no symptoms, is also common. Birds that survive for two weeks usually live but may have permanent neurological damage and/or a permanent decrease in egg production. The symptoms may be less severe in vaccinated birds.

Similar clinical signs are seen in other species of birds; however, either neurological signs or respiratory signs can predominate in some species. Newcastle disease is generally milder in turkeys than chickens, but some strains may cause significant disease. Severe clinical signs can sometimes be seen in game birds, particularly pheasants. Respiratory signs have been reported in some but not all outbreaks in pheasants. Guinea fowl sometimes become ill, but they can also carry velogenic isolates subclinically.

**Newcastle Disease**

In psittacine birds, Newcastle disease may be acute, subacute, chronic or inapparent. The clinical signs are highly variable, but may include respiratory and/or neurologic signs, as well as diarrhea and sudden death. Respiratory signs tend to predominate in ostriches and emus, and these birds are usually less severely affected than chickens. Diarrhea, polydipsia, conjunctivitis and neurological signs are generally seen in pigeons and doves. Neurological signs, particularly talon convulsions and the inability to coordinate flight, are prominent in raptors. Sudden death may also occur. Geese and ducks are usually infected subclinically (with most strains), but illness is occasionally reported. Neurological signs, diarrhea, anorexia and sudden death may be seen in these birds. Respiratory symptoms appear to be rare in waterfowl.

In cormorant colonies, Newcastle disease is usually characterized by neurological signs, and illness is almost always limited to juveniles. Affected birds may be weak, with paresis or paralysis of one or both legs and/or wings, incoordination, tremors, torticollis and/or drooping of the head. Sick or dead birds can be found in the same nest as normally normal nestmates. Older fledged cormorants may be seen trying to walk, fly, swim or dive. Sick or dead gulls and juvenile white pelicans have been seen near affected cormorant colonies. Sick pelicans had neurological signs similar to cormorants, such as unilateral or bilateral wing and or leg paralysis/ paresis, drooping neck, and an inability or reluctance to move; however, it has not been proven that these symptoms were caused by APMV-1. In addition to increased mortality, the only clinical signs reported in gulls were wing and/or leg paralysis or paresis.

**Post Mortem Lesions**

Significant gross lesions are usually found only in birds infected with velogenic strains. The head or peri orbital region may be swollen, and the interstitial tissue of the neck can be edematous, especially near the thoracic inlet. Congestion or hemorrhages may be found in the caudal pharynx and tracheal mucosa, and diphtheritic membranes sometimes occur in the oropharynx, trachea and esophagus. Petechiae and small ecchymoses may be seen in the mucosa of the proventriculus. Hemorrhages, ulcers, edema and/or necrosis often occur in the cecal tonsils and lymphoid tissues of the intestinal wall (including Peyer’s patches); this lesion is particularly suggestive of Newcastle disease. Thymic and bursal hemorrhages may also be present, but can be difficult to see in older birds. The spleen may be enlarged, friable and dark red or mottled. Pancreatic necrosis and pulmonary edema can be found in some birds. The ovaries are often edematous or degenerated, and may contain hemorrhages. Some birds, particularly those that die suddenly, have few or no gross lesions. Similar lesions have been reported in geese, turkeys, pheasants and other species infected with virulent strains. In experimentally infected guinea fowl, the only significant lesions were hemorrhages at the tip of the glands of the proventriculus and in the cecal tonsil.
In chickens infected with less virulent strains, the lesions may be limited to congestion and mucoid exudates in the respiratory tract, and opacity and thickening of the air sacs. More severe lesions can be seen in birds with secondary bacterial infections.

**Morbidity and Mortality**

Morbidity and mortality rates vary greatly depending on the virulence of the strain and susceptibility of the host. Lentogenic and mesogenic viruses usually kill few birds; in poultry, the mortality rate is approximately 10% for mesogenic strains and negligible with lentogenic strains. Concurrent illnesses may increase the severity of illness and result in a higher death rate. In contrast, velogenic isolates have morbidity and mortality rates up to 100% in unvaccinated chickens. The onset of disease is usually rapid, and the virus often spreads quickly, particularly in group-housed flocks. Some isolates can affect young birds more severely. Vaccinated poultry tend to have milder infections. In one epidemic mainly affecting vaccinated chickens, flock mortality rates were 30% to 90%.

Other species of birds are usually affected less severely than chickens. Velogenic isolates can kill up to 100% of experimentally infected pheasants, but some individual birds may be resistant to disease, and the mortality rate reported during outbreaks is highly variable. From 22% to 77% of the pheasants in affected flocks died during one epizootic in Denmark, but in another outbreak in the U.K., the mortality rate was less than 3% even in the most severely affected pen. In guinea fowl, the mortality rate was 21% during one outbreak, and 8-100% in experimental infected birds (depending on the strain of the virus). Mortality rates as high as 28% have been reported in ostriches in some outbreaks, but few birds died in others. Newcastle disease is rarely severe in waterfowl; however, some velogenic strains circulating in China have an average morbidity rate of 17.5% and an average mortality rate of 9% in geese.

APMV-1 (PPMV-1) is endemic in pigeons and doves in many countries. In these birds, highly virulent strains have morbidity rates as high as 70% and mortality rates that approach 40%. Velogenic strains are endemic in cormorants, but adult birds do not appear to develop clinical signs or die. The estimated mortality during several outbreaks in juvenile cormorants ranged from less than 1% to 92%. Up to 90% of juvenile white pelicans near these colonies have died in some outbreaks; however, it has not been proven that the disease in pelicans was caused by APMV-1.

**Diagnosis**

**Clinical**

Newcastle disease should be considered, especially in chicken flocks, when the morbidity and mortality rates are high, and the symptoms could be consistent with this disease. Unexpected deaths are sometimes the first sign. There are no pathognomonic gross lesions; however, some lesions may be suggestive, particularly when several carcasses are examined.

**Differential diagnosis**

The differential diagnosis for velogenic Newcastle disease includes other causes of septicemia, enteritis, respiratory disease and/or neurologic signs. In poultry, these diseases include fowl cholera, highly pathogenic avian influenza, laryngotracheitis, the diphtheritic form of fowl pox, psittacosis, mycoplasmosis, infectious bronchitis, aspergillosis, and management problems such as deprivation of water or feed, and poor ventilation. In pet birds, diseases to consider include psittacosis, Pacheco’s disease, salmonellosis, adenovirus, and nutritional deficiencies, as well as other paramyxovirus infections. In cormorants, botulism, fowl cholera and traumatic skeletal abnormalities are among the differentials.

**Laboratory tests**

Newcastle disease can be diagnosed by isolating APMV-1 from affected birds. This virus is usually recovered by inoculating samples into 9-11 day old embryonated chicken eggs. Chorioallantoic fluid from the eggs is tested for hemagglutinating activity, and any agents that hemagglutinate are examined for hemagglutination inhibition (HI) with a monospecific antiserum to APMV-1. Some HI tests that use monoclonal antibodies can identify particular strains of APMV-1. APMV-1 can cross-react with some other avian paramyxoviruses, particularly APMV-3 and APMV-7, in the HI test.

The pathogenicity of the isolate can be quantified by 1) the mean death time (MDT) in chicken embryos, 2) the intracerebral pathogenicity index (ICPI) in 1-day old chicks, or 3) the intravenous pathogenicity index (IVPI) in 6-week old chickens. In the MDT assay, velogenic isolates have an MDT less than 60 hours, mesogenic strains have an MDT of 60-89 hours, and lentogenic viruses have an MDT greater than 90 hours. The ICPI and IVPI tests are scoring systems that evaluate illness or death in chickens. The values in the ICPI test range from 0 to 2.0; the most virulent viruses approach 2.0, while lentogenic strains are usually close to 0.0. The values in the IVPI test are from 0 to 3.0; the IVPI for velogenic strains approach 3.0, while lentogenic strains and some mesogenic strains have IVPI values of zero. However, some viruses that can produce severe disease have IVPI values of zero; the ICPI test is generally preferred for this reason. Other variations of these tests are also used; some can distinguish viscerotrophic (velogenic) from neurotropic strains.

Reverse-transcription polymerase chain reaction (RT-PCR), gene sequencing, restriction enzyme analysis and other molecular techniques are also used to identify APMV-1 in eggs or clinical specimens. Some of these tests can also determine the virus’s pathotype. Most isolates that are highly virulent for chickens have a particular sequence, 112R/K-R-Q-K/R-R116 (multiple basic amino acids) at the
C-terminus of the F2 protein and phenylalanine at residue 117 of the F1 protein. The presence of this genetic sequence is enough to classify an isolate as highly virulent for the purposes of international trade. If this pattern is not present, the pathogenicity of the virus must be determined in the ICPI or other test. Rapid diagnostic tests, as well as tests using monoclonal antibodies, are optimized for more virulent viruses, and may not identify some lentogenic viruses (particularly Class I isolates).

Serological assays may be useful in some circumstances. Hemagglutination inhibition is the most commonly used serological test. Other tests include virus neutralization, hemagglutination and enzyme-linked immunosorbent assays (ELISA). Vaccination can interfere with serologic testing. In some species, immunohistochemistry may be used to detect antigens in tissues; this test is not performed routinely for diagnosis in chickens.

Samples to collect

Before collecting or sending any samples from animals with a suspected foreign animal disease, the proper authorities should be contacted. Samples should only be sent under secure conditions and to authorized laboratories to prevent the spread of the disease. Newcastle disease is zoonotic; samples should be collected and handled with all appropriate precautions.

Tracheal and cloacal swabs should be taken from live birds for virus isolation. If cloacal swabs might harm the bird, fresh feces may be collected instead. Whenever possible, samples should be taken in the early stages of disease. At necropsy, samples should be collected from the spleen, trachea, lung, intestines (particularly the cecal tonsil), intestinal contents, liver, kidneys, heart and brain. Oronasal swabs should also be taken. Samples for virus isolation should be collected from recently dead birds or moribund birds after euthanasia. Tissues may be collected separately or pooled; intestinal samples are generally processed separately. These samples should be kept cold (e.g. on wet ice), and swabs should be sent to the laboratory in transport medium. Similar tissues and feces are collected for RT-PCR and other molecular assays. Clotted blood or serum samples can be submitted for serology.

Recommended actions if highly virulent Newcastle disease is suspected

Notification of authorities

State and federal veterinarians should be informed immediately of any suspected cases of highly virulent (velogenic) Newcastle disease.

Federal: Area Veterinarians in Charge (AVIC):
www.aphis.usda.gov/animal_health/area_offices/
State Veterinarians:
www.usaha.org/Portals/6/StateAnimalHealthOfficials.pdf

Control

Good biosecurity can help prevent Newcastle disease in poultry flocks. Flocks should not be allowed to contact domesticated poultry of unknown health status, any pet birds (particularly psittacines), and wild or feral birds (particularly cormorants, gulls and pigeons). Whenever possible, workers should avoid contact with birds outside the farm. Biosecurity measures include bird-proofing houses, feed and water supplies, minimizing travel on and off the facility, and disinfecting vehicles and equipment that enter the farm. Pests such as insects and mice should also be controlled. If possible, employees should shower and change into dedicated clothing for work. All in/ all out breeding (one age group per farm), with disinfection between groups, is also advisable. More detailed biosecurity guidelines can be found in the Internet Resources section of this factsheet.

Similar biosecurity measures can protect birds kept in zoos or aviaries, or as pets (see Internet Resources). Establishing an effective biosecurity program can decrease the risk that hobby or pet birds would be euthanized during a Newcastle disease outbreak. Pet birds should be bought only from suppliers who can certify that the birds have been imported legally or bred in the U.S., and are healthy. Legally imported pet birds have been quarantined and tested for velogenic strains of APMV-1. Domestically raised birds are usually closed-banded. Some species such as Amazon parrots are difficult to raise domestically; vendors who are selling large numbers of young birds of these species (particularly when they are bargain-priced) without adequate documentation should be viewed with caution. Newly acquired birds should be isolated or quarantined for at least 30 days, and they should be monitored closely for signs of illness. Avian carcasses (of any species) that could be infected with velogenic Newcastle disease should never be fed to raptors, chickens or other birds. Illegally imported psittacines should be reported, because many of them may be carrying velogenic APMV-1.

Vaccines are used in chickens, pheasants and other species. In addition, birds in aviaries, breeding farms and zoos are often vaccinated. Vaccination can protect birds from clinical signs but does not necessarily prevent virus replication and shedding. Sentinel chickens are sometimes used to monitor vaccinated flocks.

Outbreaks are eradicated with quarantines and movement controls, depopulation of all infected and exposed birds, and thorough cleaning and disinfection of the premises. Effective disinfectants include chlorhexidine, sodium hypochlorite (6%), phenolic disinfectants and oxidizing agents (e.g. Virkon®). APMV-1 can also be inactivated by heat (56°C [133°F] for 3 hours or 60°C [140°F] for 30 min), acid (pH 3), ether and formalin; the efficacy of formalin varies with the temperature. Whether flies are competent vectors for APMV-1 is still uncertain, but fly control is prudent on and near infected farms. Before
eradication begins, the facilities should be treated with insecticides that can kill adult flies. Insect control should be continued until disinfection is complete. Farms must generally remain empty for a few weeks beforerestocking; the specific time may vary with the climate, season and other factors. During some eradication programs, government agencies may collect and test birds that die suddenly in any facility. This measure can be helpful in recognizing new cases.

Public Health

Velogenic strains of APMV-1 can cause conjunctivitis in humans, usually when the person has been exposed to large quantities of virus. Laboratory workers and vaccination crews are affected most often. Poultry workers are rarely infected, and handling or consuming poultry products does not appear to be a risk. The conjunctivitis usually resolves rapidly without treatment, but APMV-1 is shed in the ocular discharges for 4 to 7 days. All direct or indirect contact with birds should be avoided during this time.

Mild, self-limiting influenza-like disease with fever, headache and malaise has also been reported in humans; in some cases, it is uncertain whether the illness was caused by APMV-1 or misdiagnosed by cross-reactions in serologic tests. A recent report, confirmed by virus isolation, suggests that APMV-1 could cause serious opportunistic infections in people who are immunosuppressed. A patient developed fatal pneumonia 18 days after receiving a peripheral blood stem cell transplant. There was no history of contact with poultry, and the isolate was most closely related to APMV-1 viruses from pigeons.

Internet Resources

California Department of Food and Agriculture. Newcastle Disease Information  
http://www.cdfa.ca.gov/ahfss/Animal_Health/Newcastle_Disease_Info.html

The Merck Veterinary Manual  
http://www.merckvetmanual.com/mvm/index.jsp

United States Animal Health Association. Foreign Animal Diseases  

United States Department of Agriculture (USDA). Biosecurity for the Birds  
http://www.aphis.usda.gov/animal_health/birdbiosecurity/

World Organization for Animal Health (OIE)  
http://www.oie.int

OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals  
http://www.oie.int/international-standard-setting/terrestrial-manual/access-online/

Newcastle Disease

OIE Terrestrial Animal Health Code  
http://www.oie.int/international-standard-setting/terrestrial-code/access-online/

References


Jørgensen PH, Herczeg J, Lomniczi B, Manvell RJ, Holm E, Alexander DJ. Isolation and characterization of avian paramyxovirus type 1 (Newcastle disease) viruses from a flock of ostriches (Struthio camelus) and emus (Dromaius novaehollandiae) in Europe with inconsistent serology. Avian Pathol. 1998;27:352-8.


Rabies Virus

Principal investigators are responsible for communicating this information to staff working with or around this agent, and for mitigation of associated risks. This document is not intended to be used as a sole source for diagnosis, medical treatment, or medical advice. Consult a CSU Authorized Treating Physician for concerns about work related medical conditions.

CONTAINMENT AND SPECIAL PRECAUTIONS

Containment:
- BSL-2 level practices, containment equipment and facilities are recommended for infectious or potentially infected materials, animals, or cultures
- BSL-3 and ABSL-3 level practices, containment equipment and facilities are required when aerosols are likely

Special considerations:
- High fatality rate!
- All personnel working with the virus or infected animals should be immunized and have demonstrable anti-viral titers.

HAZARD IDENTIFICATION

Disease: Rabies, Hydophobia

Transmission: Saliva containing virus introduced by bite or scratch, aerosol.

Communicability: Person to person possible but rare and only documented in transplant recipients

Incubation: 10 days to many months

Infectious dose: Unknown

VIABILITY/INACTIVATION

Inactivation:
- Autoclave sensitive
- UV radiation and lipid solvent sensitive
- Susceptible to 1% sodium hypochlorite, 2% glutaraldehyde, 70% ethanol, formaldehyde

MEDICAL

Signs and symptoms:

***Once symptoms occur Rabies is ~100% Fatal – DO NOT WAIT FOR SYMPTOMS***

- Malaise
- Fever
- Headache
- Discomfort, pain
- Anxiety
- Confusion
- Agitation
- Insomnia
- Abnormal behavior
- Sensitivity to light and sound
- Delirium
- Hallucinations
- Slight or partial paralysis
- Hypersalivation
- Difficulty swallowing
- Pharyngeal spasms upon exposure to liquids
- Convulsions
- Furious hyperexcitability
- Hydrophobia
- Death within 2 to 10 days from onset of symptoms
Diagnosis:
Serology – ELISA or EIA to check for IgM
Saliva – Virus isolation or RT-PCR

Treatment:
- Pre-exposure prophylaxis:
  o VACCINATION AVAILABLE
  o From the 2008 ACIP Recommendations for human rabies prevention: Table 5 below describes the pre-exposure prophylaxis schedule, and Table 6 determines who might get vaccinated
- Post-exposure prophylaxis:
  o From the 2008 ACIP Recommendations for human rabies prevention: Table 3 below displays the prophylaxis guide based on animal exposure
  o From the 2010 ACIP Recommendations for use of a reduced (4-dose) vaccine schedule for post-exposure prophylaxis to prevent human rabies: Table 3 displays the post-exposure prophylaxis schedule

TABLES FROM 2008 RECOMMENDATIONS OF THE ADVISORY COMMITTEE ON IMMUNIZATION PRACTICES

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5703a1.htm

**Disclaimer** This document is for informational purposes ONLY. This document should not be used in lieu of professional medical attention, and medical professionals should seek appropriate resources for diagnosis and treatment.**
**TABLE 6. Rabies pre-exposure prophylaxis guide — United States, 2008**

<table>
<thead>
<tr>
<th>Risk category</th>
<th>Nature of risk</th>
<th>Typical populations</th>
<th>Pre-exposure recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous</td>
<td>Virus present continuously, often in high concentrations. Specific exposures likely to go unrecognized. Bite, nonbite, or aerosol exposure.</td>
<td>Rabies research laboratory workers; rabies biology production workers.</td>
<td>Primary course. Serologic testing every 6 months; booster vaccination if antibody titer is below acceptable level.*</td>
</tr>
<tr>
<td>Frequent</td>
<td>Exposure usually episodic, with source recognized, but exposure also might be unrecognized. Bite, nonbite, or aerosol exposure.</td>
<td>Rabies diagnostic laboratory workers, cavers, veterinarians, and animal-control and wildlife workers in areas where rabies is enzootic. All persons who frequently handle bats.</td>
<td>Primary course. Serologic testing every 2 years; booster vaccination if antibody titer is below acceptable level.*</td>
</tr>
<tr>
<td>Infrequent (greater than population at large)</td>
<td>Exposure nearly always episodic with source recognized. Bite or nonbite exposure.</td>
<td>Veterinarians and animal-control staff working with terrestrial animals in areas where rabies is uncommon to rare. Veterinary students. Travelers visiting areas where rabies is enzootic and immediate access to appropriate medical care including biologics is limited.</td>
<td>Primary course. No serologic testing or booster vaccination.</td>
</tr>
<tr>
<td>Rare (population at large)</td>
<td>Exposure always episodic with source recognized. Bite or nonbite exposure.</td>
<td>U.S. population at large, including persons in areas where rabies is epizootic.</td>
<td>No vaccination necessary.</td>
</tr>
</tbody>
</table>

*Minimum acceptable antibody level is complete virus neutralization at a 1:5 serum dilution by the rapid fluorescent focus inhibition test. A booster dose should be administered if the titer falls below this level.

**TABLE 3. Rabies postexposure prophylaxis guide — United States, 2008**

<table>
<thead>
<tr>
<th>Animal type</th>
<th>Evaluation and disposition of animal</th>
<th>Postexposure prophylaxis recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dogs, cats, and ferrets</td>
<td>Healthy and available for 10 days observation. Rabies or suspected rabies.</td>
<td>Persons should not begin prophylaxis unless animal develops clinical signs of rabies.*</td>
</tr>
<tr>
<td>Skunks, raccoons, foxes, and most other carnivores; bats†</td>
<td>Unknown (e.g., escaped) Regarded as rabid unless animal proven negative by laboratory tests§</td>
<td>Consult public health officials. Consider immediate prophylaxis.</td>
</tr>
<tr>
<td>Livestock, small rodents (rabbits and hares), large rodents (woodchucks and beavers), and other mammals</td>
<td>Consider individually</td>
<td>Consult public health officials. Bites from squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, other small rodents, rabbits, and hares almost never require anti-rabies postexposure prophylaxis.</td>
</tr>
</tbody>
</table>

*During the 10-day observation period, begin postexposure prophylaxis at the first sign of rabies in a dog, cat, or ferret that has bitten someone. If the animal exhibits clinical signs of rabies, it should be euthanized immediately and tested.
†Postexposure prophylaxis should be initiated as soon as possible following exposure to such wildlife unless the animal is available for testing and public health authorities are facilitating expeditious laboratory testing or it is already known that brain material from the animal has tested negative. Other factors that might influence the urgency of decision-making regarding initiation of postexposure prophylaxis before diagnostic results are known include the species of the animal, the general appearance and behavior of the animal, whether the encounter was provoked by the presence of a human, and the severity and location of bites. Discontinue vaccine if appropriate laboratory diagnostic test (i.e., the direct fluorescent antibody test) is negative.
§The animal should be euthanized and tested as soon as possible. Holding for observation is not recommended.
TABLE FROM 2010 RECOMMENDATIONS OF THE ADVISORY COMMITTEE ON USE OF REDUCED (4-DOSE) VACCINE SCHEDULE FOR POSTEXPOSURE PROPHYLAXIS TO PREVENT HUMAN RABIES


TABLE 3. Rabies postexposure prophylaxis (PEP) schedule --- United States, 2010

<table>
<thead>
<tr>
<th>Vaccination status</th>
<th>Intervention</th>
<th>Regimen*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not previously</td>
<td>Wound cleansing</td>
<td>All PEP should begin with immediate thorough cleansing of all wounds with</td>
</tr>
<tr>
<td>vaccinated</td>
<td></td>
<td>soap and water. If available, a virucidal agent (e.g., povidone-iodine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>solution) should be used to irrigate the wounds.</td>
</tr>
<tr>
<td></td>
<td>Human rabies immune globulin</td>
<td>Administer 20 IU/kg body weight. If anatomically feasible, the full dose</td>
</tr>
<tr>
<td>(HRIG)</td>
<td></td>
<td>should be infiltrated around and into the wound (s), and any remaining</td>
</tr>
<tr>
<td></td>
<td></td>
<td>volume should be administered at an anatomical site (intramuscular (IM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>distant from vaccine administration. Also, HRIG should not be</td>
</tr>
<tr>
<td></td>
<td></td>
<td>administered in the same syringe as vaccine. Because HRIG might</td>
</tr>
<tr>
<td></td>
<td></td>
<td>partially suppress active production of rabies virus antibody, no more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>than the recommended dose should be administered.</td>
</tr>
<tr>
<td></td>
<td>Vaccine</td>
<td>Human diploid cell vaccine (HDCV) or purified chick embryo cell vaccine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(PCECV) 1.0 mL, IM (deltoid area*), 1 each on days 0, 3, 7 and 14.†</td>
</tr>
<tr>
<td>Previously</td>
<td>Wound cleansing</td>
<td>All PEP should begin with immediate thorough cleansing of all wounds with</td>
</tr>
<tr>
<td>vaccinated**</td>
<td></td>
<td>soap and water. If available, a virucidal agent such as povidone-iodine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>solution should be used to irrigate the wounds.</td>
</tr>
<tr>
<td></td>
<td>HRIG</td>
<td>HRIG should not be administered.</td>
</tr>
<tr>
<td></td>
<td>Vaccine</td>
<td>HDCV or PCECV 1.0 mL, IM (deltoid area*), 1 each on days 0, 3 and 5.‡</td>
</tr>
</tbody>
</table>

* These regimens are applicable for persons in all age groups, including children.
† The deltoid area is the only acceptable site of vaccination for adults and older children. For younger children, the outer aspect of the thigh may be used. Vaccines should never be administered in the gluteal area.
‡ Day 0 is the day dose 1 of vaccine is administered.
§ For persons with immunosuppression, rabies PEP should be administered using all 5 doses of vaccine on days 0, 3, 7, 14, and 28.
** Any person with a history of pre-exposure vaccination with HDCV, PCECV, or rabies vaccine adsorbed (RVA); prior PEP with HDCV, PCECV or RVA; or previous vaccination with any other type of rabies vaccine and a documented history of antibody responses to the prior vaccination.

WHAT TO DO IF AN EXPOSURE OCCURS

Employees, Graduate Students, Work Study

1. Employee notifies Biosafety (970-491-0270) and/or Occupational Health Program Coordinator (970-420-8172) to inform where medical attention will be sought and if transportation is needed
   - The Principal Investigator/Supervisor must also be notified
2. Employee goes to Emergency Room
3. After the Emergency Room visit, individual fills out the following forms:
   - Workers’ Compensation (within 4 days or as soon as possible): http://www.ehs.colostate.edu/WWorkComp/Home.aspx
4. Employee follows up with CSU Authorized Treating Physician
Student Not Paid by CSU
1. Contact supervisor/PI
2. Student or supervisor contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to arrange transportation if needed
3. Student goes to CSU Health Network (formerly Hartshorn Health Services)
4. After the visit to CSU Health Network, student fills out Biosafety Incident Report form
   http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf

Volunteers and Visitors
1. Contact supervisor/PI
2. Contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to arrange transportation if needed
3. Individual goes to their personal physician, or as otherwise directed by their physician
4. Individual fills out Biosafety Incident Report form
   http://www.ehs.colostate.edu/WBiosafety/PDF/IncidentReportForm.pdf

REFERENCES
• ACIP Post Exposure Vaccination Recommendations:
  http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5902a1.htm
• CDC Web Information: http://www.cdc.gov/rabies/
• Human Rabies Prevention --- United States, 2008: Recommendations of the Advisory Committee on Immunization Practices: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5703a1.htm
• Iowa State University Technical Sheet: http://www.cfsph.iastate.edu/Factsheets/pdfs/rabies.pdf

CONTENT REVIEW
This document has been reviewed by:
• CSU subject matter expert: Dr. Richard Bowen
Rift Valley Fever Virus

Principal investigators are responsible for communicating this information to staff working with or around this agent, and for mitigation of associated risks. This document is not intended to be used as a sole source for diagnosis, medical treatment, or medical advice. Consult a CSU Authorized Treating Physician for concerns about work related medical conditions.

CONTAINMENT AND SPECIAL PRECAUTIONS

Containment
- BSL-3 Level practices, containment equipment and facilities are required for work involving potentially infected materials. ABSL-3 Level practices are required for studies involving rodents.

Special considerations:
- Select Agent
- Mosquito borne disease

HAZARD IDENTIFICATION

Disease: Rift Valley Fever

Transmission: Mosquito, direct contact through open wound with blood or organs of infected animal, aerosols

Incubation: 3-12 days, typically 2-6 days

Infectious dose: unknown

VIABILITY/INACTIVATION

Stability: Virus remains viable in aerosols for more than 1 hour at 25 C. Quickly destroyed by pH changes in decomposing carcasses, virus can survive for as long as 4 months at 4 C in neutral or alkaline pH, mixed with serum or other proteins.

Inactivation:
- Autoclave sensitive
- Resistant to neutral and alkaline pH, can survive 8 years below freezing
- Susceptible to low pH, lipid solvents, detergents and sodium or calcium hydroxide

MEDICAL

Signs and symptoms:
- Fever
- Weakness
- Back pain
- Dizziness
- Weight loss
- Recover 2-7 days post infection
- More severe disease –
  - Hemorrhagic fever
  - Encephalitis
  - Ocular disease
Pre-exposure prophylaxis:

Investigational vaccine through USAMRIID

Diagnosis:

Serology – Neutralization tests, ELISA or EIA to check for IgM
RT-PCR
Serum taken:

Day of exposure, and 10-14 days post infection to detect 4-fold rise in titer

Treatment:

- **Post-exposure prophylaxis:**
  - Supportive care and possibly ribavirin and interferon

- **Treatment of clinical cases:**
  - Treatment is supportive and symptomatic

**WHAT TO DO IF AN EXPOSURE OCCURS**

**Employees, Graduate Students, Work Study**

1. Employee notifies Biosafety (970-491-0270) and/or Occupational Health Program Coordinator (970-420-8172) to inform where medical attention will be sought and if transportation is needed
   - The Principal Investigator/Supervisor must also be notified
2. Employee goes to Emergency Room
3. After the Emergency Room visit, individual fills out the following forms:
   - Workers’ Compensation (within 4 days or as soon as possible): [http://www.ehs.colostate.edu/WWorkComp/Home.aspx](http://www.ehs.colostate.edu/WWorkComp/Home.aspx)
4. Employee follows up with CSU Authorized Treating Physician

**Student Not Paid by CSU**

1. Contact supervisor/PI
2. Student or supervisor contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to arrange transportation if needed
3. Student goes to CSU Health Network (formerly Hartshorn Health Services)

**Volunteers and Visitors**

1. Contact supervisor/PI
2. Contact Biosafety (491-0270) or Occupational Health (420-8172) to inform where attention is being sought, and to arrange transportation if needed
3. Individual goes to their personal physician, or as otherwise directed by their physician
REFERENCES

- CDC Website: http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/Fact_Sheets/Rift%20Valley%20Fever%20Fact%20Sheet.pdf
- Iowa State University Fact Sheet: http://www.cfsph.iastate.edu/Factsheets/pdfs/rift_valley_fever.pdf
- WHO Fact Sheet: http://www.who.int/mediacentre/factsheets/fs207/en/

CONTENT REVIEW

This document has been reviewed by:

- CSU subject matter expert: Dr. Richard Bowen
Yersinia pestis

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CONTAINMENT AND SPECIAL PRECAUTIONS

Containment
- BSL-3 level practices, containment equipment, and facilities are required for work involving infectious body fluids, tissues, animals and cultures.

Special considerations:
- Select Agent, Tier 1
- Zoonotic

HAZARD IDENTIFICATION

Disease: Bubonic, pneumonic and septicemic plague

Transmission: Bite of infected flea, inhalation, animal-to-human or person-to-person transmission by human fleas or directly in pneumonic plague, handling infected tissues, touching or skinning infected animals

Communicability: Person to person spread possible through aerosol transmission

Incubation: Generally 1-8 , depending on form: Percutaneous: 2-8 days; pneumonic 1-6 days; Septicemic 1-4 days

Infectious dose: Unknown

VIABILITY/INACTIVATION

Stability: Viable in soil, water, carcases, hides, and grains for several weeks, and longer at near freezing temperatures. Killed within several hours of exposure to sunlight and disinfectants, or within 15 minutes of exposure to 55°C. Aerosolized bacteria will survive up to one hour, depending on conditions.

Inactivation:
- Autoclave sensitive
- 1% Sodium hypochlorite, 70% Ethanol, 2% glutaraldehyde, iodines, phenolics and formaldehyde

MEDICAL

Signs and symptoms:
- Bubonic (Flu-like, with enlarged lymph nodes)
  - Sudden onset:
    - Headache
    - Fever
    - Malaise (discomfort)
    - Swollen and painful lymphnodes
  - Myalgia (joint pain)
  - Vomiting, nausea
  - Abdominal pain
- **Pneumonic (Lung infection)**
  - Sudden onset:
    - High fever
    - Headache
    - Malaise (discomfort)
    - Myalgia (joint pain)
    - Cough (could have bloody sputum)
  - Chills
  - Nausea, vomiting
  - Diarrhea, abdominal pain
  - Respiratory failure

- **Septicemic (Blood infection)**
  - Sudden onset:
    - Fever
    - Headache
    - Chills
    - Malaise (discomfort)
    - Myalgia (joint pain)
  - Nausea, Vomiting
  - Abdominal pain
  - Hypotension
  - Meningitis -- rare

Pre-exposure prophylaxis:
- NONE – Vaccine currently unavailable in the United States

Medical Surveillance:
- Before working with or around this agent, individuals must enroll in CSU's medical surveillance program through the CSU Occupational Health Program.

Diagnosis:
- CDC Resource for diagnosis: [http://www.cdc.gov/plague/healthcare/clinicians.html](http://www.cdc.gov/plague/healthcare/clinicians.html)
- Organism cultured from sputum, blood or aspirates of lymph node on blood agar, MacConkey or infusion broth.
- PCR and immunoassays done at CDC-Fort Collins.
- Latex agglutination tests, passive hemagglutination and complement fixation tests available.
- Serum taken:
  - Day of exposure (or as early as possible) and 4-6 weeks after disease onset and >14 days post infection to detect 4-fold rise in titer

Treatment:
- CDC Resource for clinicians: [http://www.cdc.gov/plague/healthcare/clinicians.html](http://www.cdc.gov/plague/healthcare/clinicians.html)
- **Post Exposure Prophylaxis:**
  - Doxycycline (100 mg, orally every 12 hours); Ciprofloxacin (500 mg, orally every 12 hours).
  - **Chemoprophylaxis should be started within 24 hours and continue for 7 days after last known or suspected exposure**
- **Treatment of clinical cases:**
  - Streptomycin (streptomycin 30 mg/kg/day administered IM in 2 divided doses) for 10 days
- Gentamicin can be used due to toxicity or immediate nonavailability of streptomycin (5 mg/kg IV once daily or 2 mg/kg loading dose followed by 1.7 mg/kg IV every 8 hours)
- Tetracycline: loading dose 2g then 2g daily in 4 divided doses for 7 to 10 days
- Chloramphenicol 25 mg/kg every 6 hours IV

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**REFERENCES**
- CDC Website: [http://www.cdc.gov/plague/](http://www.cdc.gov/plague/)
- CDC Information for Clinicians: [http://www.cdc.gov/plague/healthcare/clinicians.html](http://www.cdc.gov/plague/healthcare/clinicians.html)
- Iowa State University Fact Sheet: [http://www.cfsph.iastate.edu/Factsheets/pdfs/plague.pdf](http://www.cfsph.iastate.edu/Factsheets/pdfs/plague.pdf)
CONTENT REVIEW

This document has been reviewed by:

- CSU subject matter expert: Dr. Richard Bowen
- Licensed Physicians: Occupational Health Services (principal: Dr. Tracy Stefanon)