

Plague - Pathogenesis

- Humans develop disease from either the bite of an infected flea or by inhaling the organism
 - Bubonic - infection of a lymph node (usually lower legs)
 - Pneumonic
 - Septicemia - spread from the lymph nodes - toxic shock
 - Oropharyngeal infections are rare, but reported



Differential Diagnosis - Bubo Formation

- Tularemia
- Cat-scratch fever
- Staph/Strep



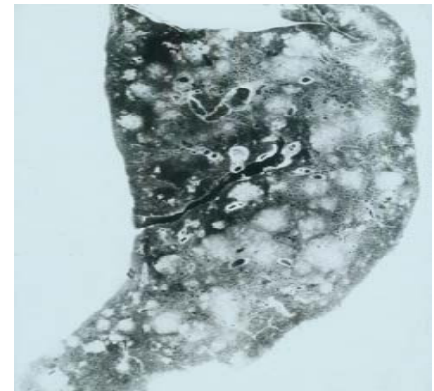
Bubo aspiration and gram stain is diagnostic.

Pneumonic Plague - Signs & Symptoms

- 2 to 3 day incubation period followed by high fever, myalgias, chills, HA, and cough with bloody sputum
- Pneumonia and sepsis develop acutely and may be fulminant
- Patchy infiltrates or consolidation seen on chest x-ray

Pneumonic Plague

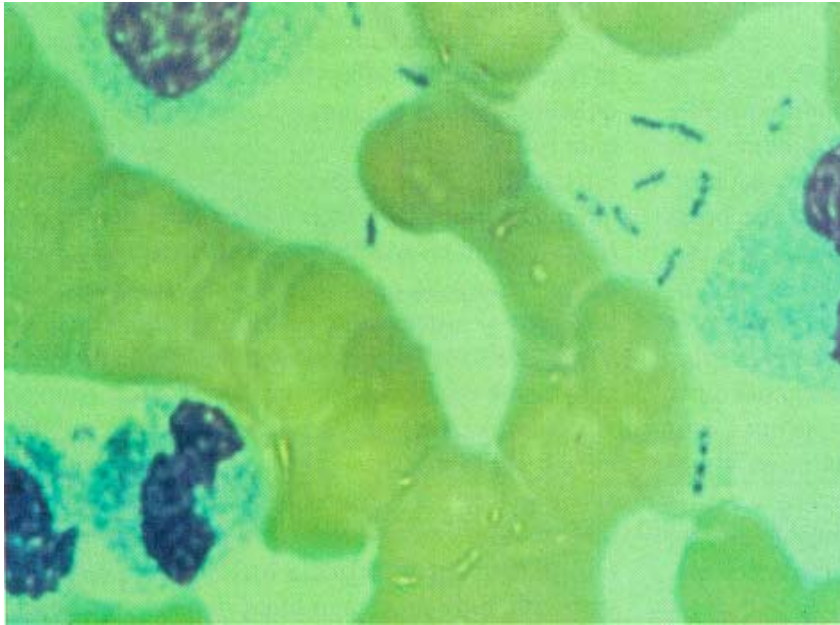
- Pneumonia and sepsis
- Patchy infiltrates seen on chest x-ray
- It's transmissible – respiratory precautions



Acral Gangrene



Plague - Diagnosis

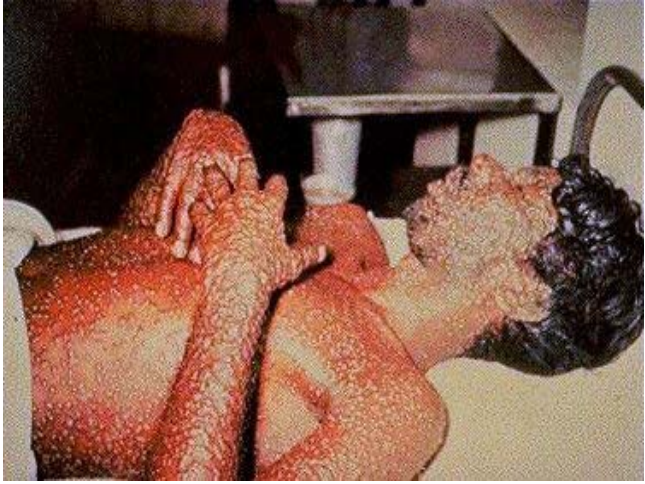


- Gram stain and culture of lymph node aspirates, sputum, or CSF samples
- Bipolar staining “Safety Pin”
- Immunoassays are also available

Pneumonic Plague - Treatment

Respiratory isolation mandatory for at least the first 48 hours of treatment

- Vaccine effective only for bubonic plague
- Prophylaxis - tetracycline or doxycycline
 - Antibiotics should be started within 24 hours of symptoms to impact survival
 - Streptomycin (30 mg/kg/day IM divided BID for 10 days)
 - Doxycycline (100 mg IV BID for 10 days)
 - Chloramphenicol for plague meningitis



Smallpox



Smallpox

- **Variola virus**
 - **Variola major (30% case fatality rate)**
 - **Variola minor (or alastrim, $\leq 1\%$ CFR)**
- **Seasonality related to generation of droplet nuclei**
- **Airborne and fomite spread**
- **Incubation period: 12-14 d (range 7-17 d)**
- **Infectious from rash onset**
- **Vaccine protection wanes substantially after ?10-20 years**

Complications of Smallpox

- Secondary bacterial infection uncommon
- Encephalitis
- “Hemorrhagic” smallpox
 - shorter incubation period
 - severe prodrome
 - dusky erythema to hemorrhage
 - pregnant women unusually susceptible
 - uniformly fatal, usually at day 5-6.
- “Malignant” smallpox
 - confluent lesions, never pustulating (red crepe rubber)
 - epidermis may slough

Smallpox - Prevention



- Contagious-airborne
- All contacts are quarantined for at least 17 days
- Infectious until all scabs are healed over

Smallpox - Diagnosis & Treatment

DIAGNOSIS

- Clinical Presentation
- Demonstrate virus from vesicular sampling via electron microscopy
- Confirmation by tissue culture

TREATMENT

- Supportive
- Vaccine available from CDC
- Immune globulin from CDC
- Cidofovir?

Smallpox versus Chickenpox

Variola

- Rash centrifugal
- Pox over 1-2 day period, all evolve at same rate
- All pox at same stage
- Rash on palms and soles
- Lesions extend into the dermis

Varicella

- Rash centripetal
- Crops of lesions at different stages of development
- Adjacent lesions at different stages
- Never on palms or soles
- Lesions not as deep

Specimen Collection: Smallpox

Specimen	Comments
	<p>Do not collect or ship any specimens without consultation from MDPH</p>
Vesicles	<p>Vesicle fluid may be placed as a drop on a clean microscope slide. Store each slide in a separate slide holder. As an alternative, collect fluid from separate lesions onto separate swabs. Include cellular material from base of lesion. Store at 4°C for for not more than 6 h. For longer periods store at –20 to –70 °C.</p>
Scabs	<p>Aseptically collect material or scrapings and place into a sterile, leakproof, freezable container. Store at 4°C for not more than 6 h. For longer periods store at –20 to –70°C.</p>
Biopsy	<p>Place tissue into a sterile, leakproof, freezable container. Store at 4°C for not more than 6 h. For longer periods store at –20 to –70°C. Formalin fixed tissue acceptable for histopathology.</p>
Autopsy Specimens	<p>Place into sterile, freezable, leakproof container. Store frozen at –20 to –70°C.</p>

Laboratory Diagnosis of Smallpox

- **Specimen collector should be vaccinated and using strict contact, droplet and respiratory precautions**
- **Vesicular/pustular fluid (swab) and scabs in secured container**
- **BL-4 laboratory**
- **Microscopic, culture and PCR**
- **Clinical diagnosis only, after first laboratory confirmation**