Coccidioidomycosis (Valley Fever) Outbreak from a Utah Archaeology Field Trip

David F. Goldsmith, MSPH, PhD
GWU Milken Institute School of Public Health--Department of Environmental & Occupational Health; tel 202-549-1019
dgoldsmi@gwu.edu Nov 1, 2017
Objectives

- Define Coccidioidomycosis (Valley Fever)
- Provide brief history of THREE (3) Valley Fever outbreaks associated with archaeology fieldwork projects
- Discuss awareness and prevention steps
- Your questions and Answers
Definition of Coccidioidomycosis (Valley Fever)

1. Inhaling spores of *Coccidioides immitis*, soil fungus endemic to southwestern U.S., Mexico, South America

2. Valley Fever arises from the ground disturbance common in construction, military maneuvers, other desert activities, dust storms, & in museum or archaeology digs.

3. Symptoms include cough, shortness of breath, chest pain, myalgia (aches), headache/sore throat; confirming studies include positive X-ray, skin tests, and + antibody test to *C. immitis*; average 10 days from initial exposure to symptoms (range 9-15 days)
Sifting materials on site
Focus on Southwestern U.S.
Valley Fever (C. immitis) spores
+ Chest X-ray for “Cocci”
Life Cycle of Coccidioides immitis

(Illustration: Michael Borjon/The Bakersfield Californian)
First Coccidioidomycosis Outbreak, 1970 (Werner et al., 1972)

• Summer project excavating Indian ruins, 103 archaeology students from Queens College NY & CS Chico; ages 17-26 (largest in med. lit.)

• 61 (65%) had illness compatible with Valley fever; no masks worn & temps were very hot (>42 C). Index case was 19 year old female presenting @ CSC Health Center w/fever, shaking chills, headache, cough, chest pain & + skin test

• 34% had X-ray abnormalities, with pneumonia; + soil culture
2nd Coccidioidomycosis Outbreak, 1972 (Werner et al., 1973)

- Summer project excavating Indian ruins, 39 archaeology students from CS Sacramento; 17 had symptoms consistent with VF
- Latency ~15 days from initial digging/sifting; attack rate higher for women than men (59 v. 41%); none required hospitalization
- Outbreak farther north near Red Bluff, CA; again very hot weather (>40 C)
3rd Coccidioidomycosis Outbreak, 2001 (Peterson et al., 2004)

- Dig at Dinosaur National Monument (DNM) in NE Utah led to 8 persons (6 students & 2 vol. leaders) having symptoms consistent w/ ‘Cocci’; all sought care at local ER.
- All worked at Swelter Shelter where NA petroglyphs and pictographs were discovered in 1960s.
- 18 studied (8 cases & 10 DNM archaeologists) w/interviews & serology testing.
**DNM Investigation--2.**

- Median incubation 10 days, w/symptoms including breathing difficulties, cough, fever, fatigue, shortness of breath, and skin rash (not reported in CA outbreaks)
- X-rays showed bilateral patchy infiltrates
- All cases treated w/antifungal medication fluconazole; resolved in ~3 days.
- 9/10 cases had IgM antibodies to *C. immitis*
- Tested for other antibodies but found neg.
Prevention Recommendations

- NIOSH recommends wet methods, minimize soil disturbance, & wearing N95 respirators when working around Swelter Shelter.
- Suggestion that fieldwork occur *after* rainfall events; soil alkalinity plays a role.
- 40 additional DNM workers were studied for serological response and none had + antibody response to *C. Immitis*
Some Cautions

• ~97% of U.S. Valley Fever cases are from AZ and CA; pregnant women, weakened immune system, African & Philippinos have higher risk

• New outbreaks reported among solar farm construction workers, movie set crew, & Central Valley (CA) inmates and prison staff

• AZ study (by Jones et al, 2017) suggests mortality rate from coccidioidomycosis is much greater than previously assumed
NIOSH-approved N95 Respirator
**Conclusion**

- If you are planning dusty museum field work in the southwest, be concerned about possible risk for coccidioidomycosis, especially during hot weather
- Prevention includes staff and volunteer education; using wet methods; appropriate respiratory protection (NIOSH approved N95 respirators)
- Be alert to symptom clusters including cough, SOB, chest pain, myalgias/headaches, rash, fever/chills & sore throat [NOT transmissible person to person]. May need serology and chest X-ray for diagnosis
Questions