UWTASP

tele-antimicrobial stewardship program

23 OCTOBER, 2018

Agenda

- Paul Pottinger: *Emerging Infections of the PNW: Coccidioidomycosis*
- Case Discussions
- Open Discussion

UWTASP

tele-antimicrobial stewardship program

- No financial conflicts of interest.
- Everything we discuss is QI, thus protected from legal discovery under WA State Code.

Paul Pottinger MD

Case...

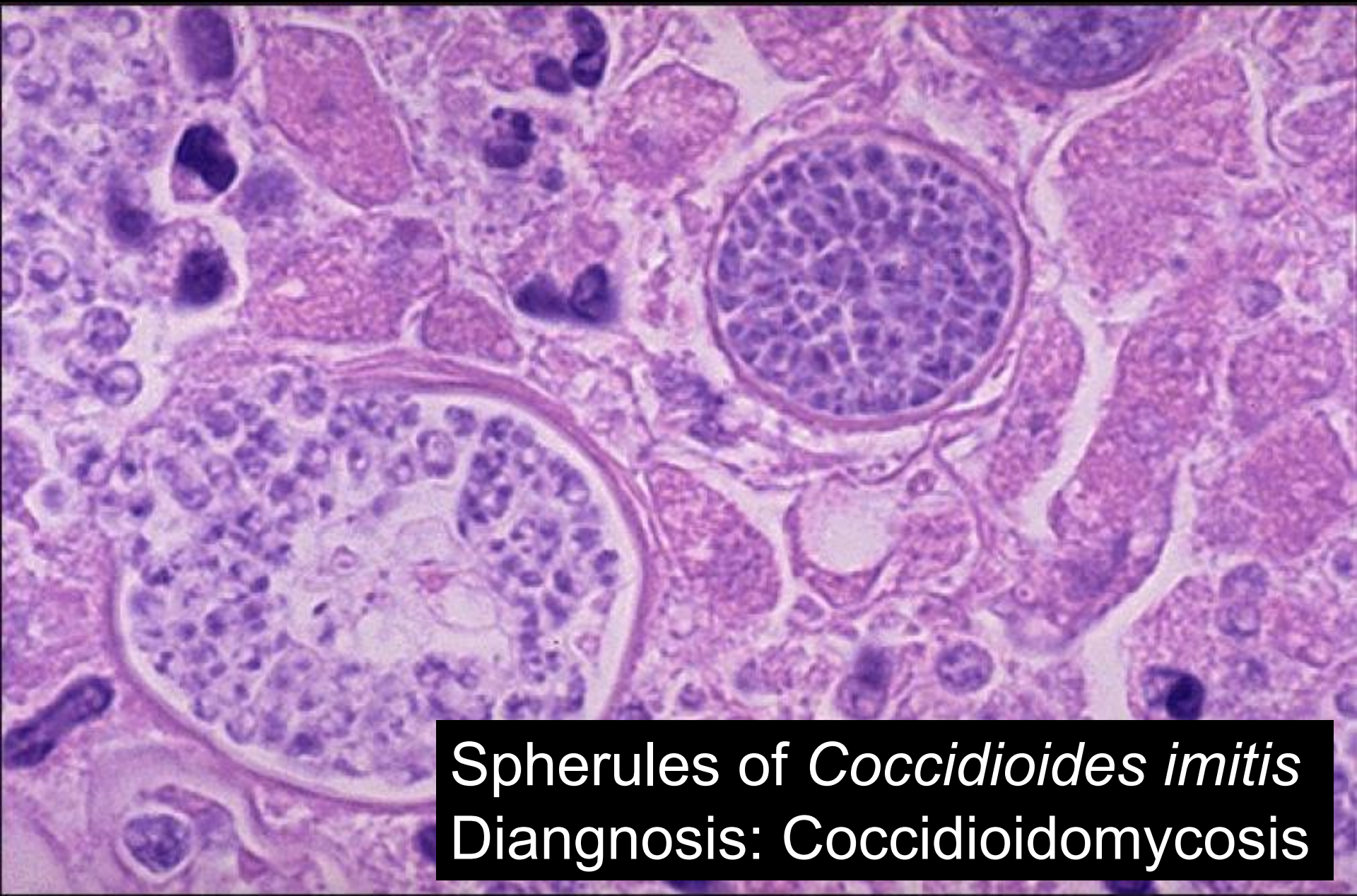
- July. Finley, WA.
- A 15 y/o boy sustains leg lacerations in ATV accident. Riding on hard-packed, dry dirt. Left prepatellar bursa sutured.
- Stitches out 10 days later… swam in Columbia River day 11.
- Day 14: Red, swollen knee.
- No response to cephalexin + TMP/SMX.
- Day 21: I&D is performed….

Another Case...

- May. Kennewick, WA.
- A 58 y/o man with advanced liver disease, construction worker in outdoor excavation.
- C/O acute fever, cough, pleuritic chest pain, WBC 23,000.
- CXR and chest CT show RML nodule and effusion. No response to Unasyn + Levo.
- Concern for pneumococcal pneumonia. Thoracentesis and BAL are performed….

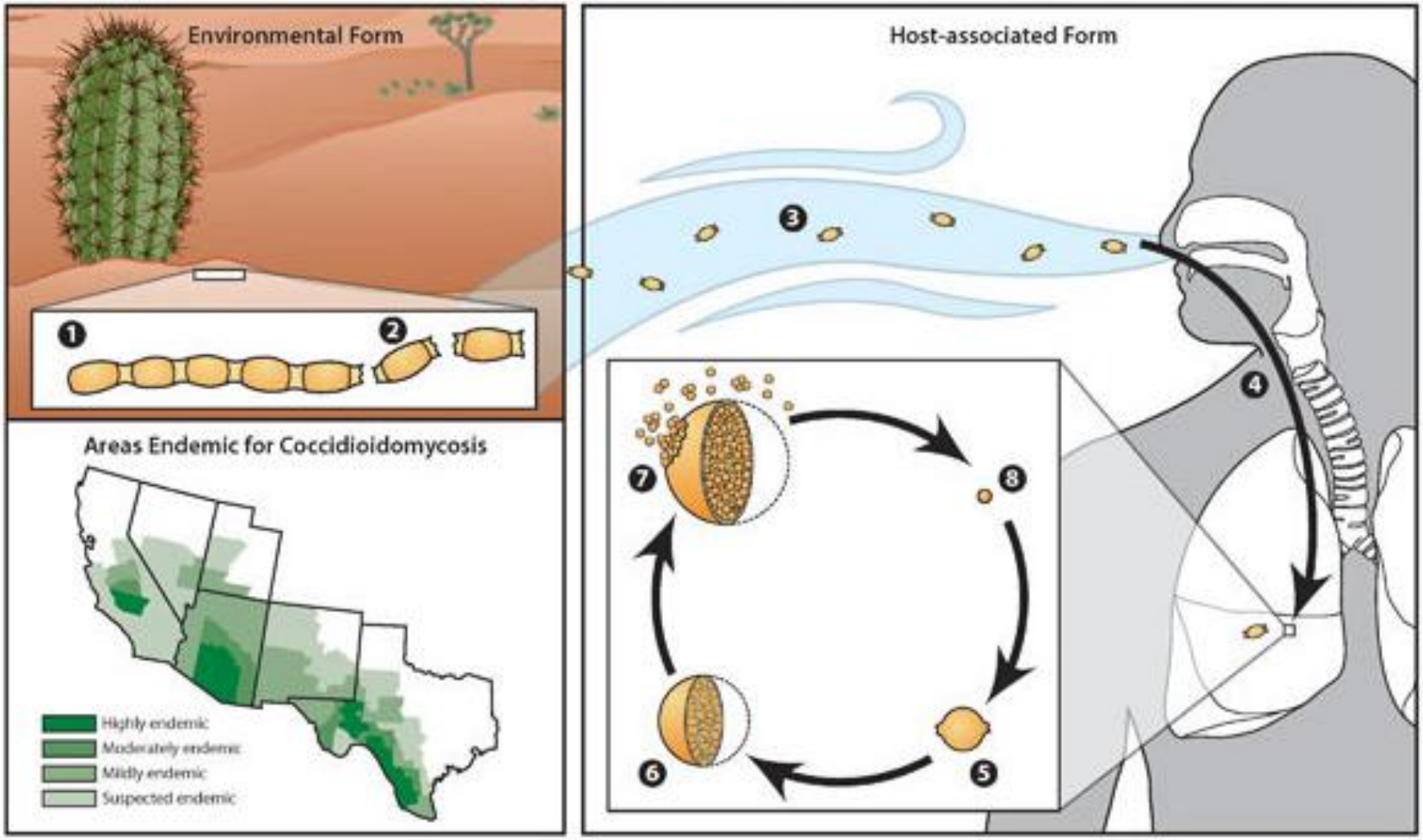
Another Case...

From the knee of one, and the lungs of the other...



Spherules of *Coccidioides imitis*
Diangnosis: Coccidioidomycosis

Biology of Coccidioidomycosis

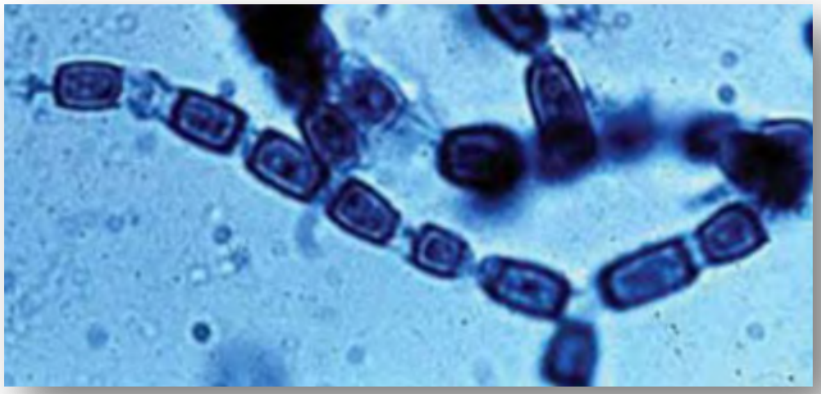


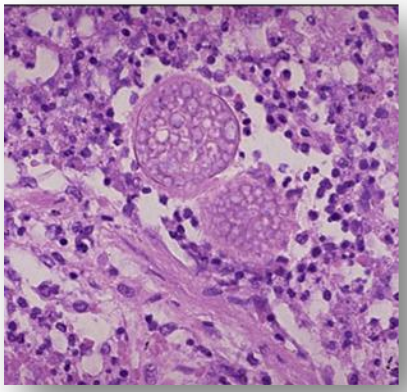
In the environment, *Coccioides ssp.* exists as a mold (1) with septate hyphae. The hyphae fragment into arthroconidia (2), which measure only 2-4 µm in diameter and are easily aerosolized when disturbed (3). Arthroconidia are inhaled by a susceptible host (4) and settle into the lungs. The new environment signals a morphologic change, and the arthroconidia become spherules (5). Spherules divide internally until they are filled with endospores (6). When a spherule ruptures (7) the endospores are released and disseminate within surrounding tissue. Endospores are then able to develop into new spherules (6) and repeat the cycle.

Emerging PNW Infection: *Coccidioidomycosis*

Coccidoides immitis

- Free-living dimorphic **fungus**
- Endemic to US Desert **Southwest**
- Usually **inhaled**
- Direct wound inoculation less common
- Body tries contain infection by making **granulomas**

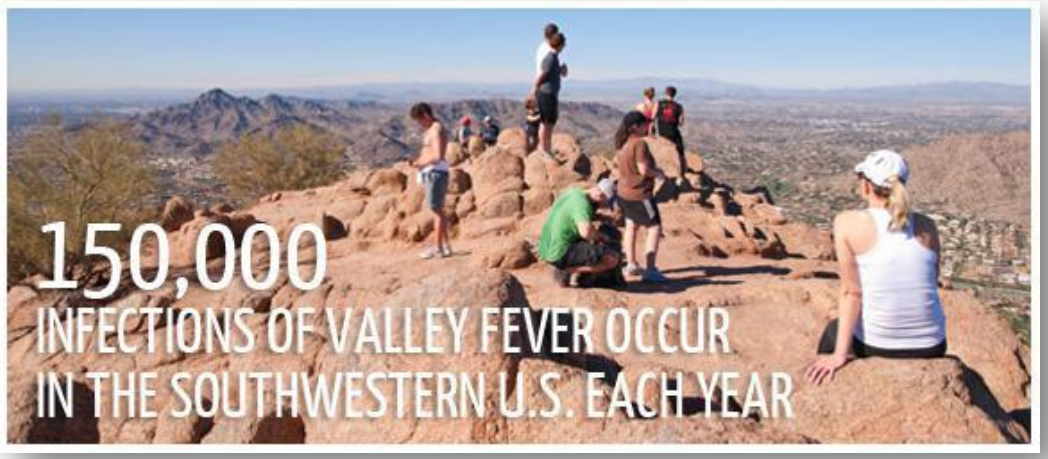


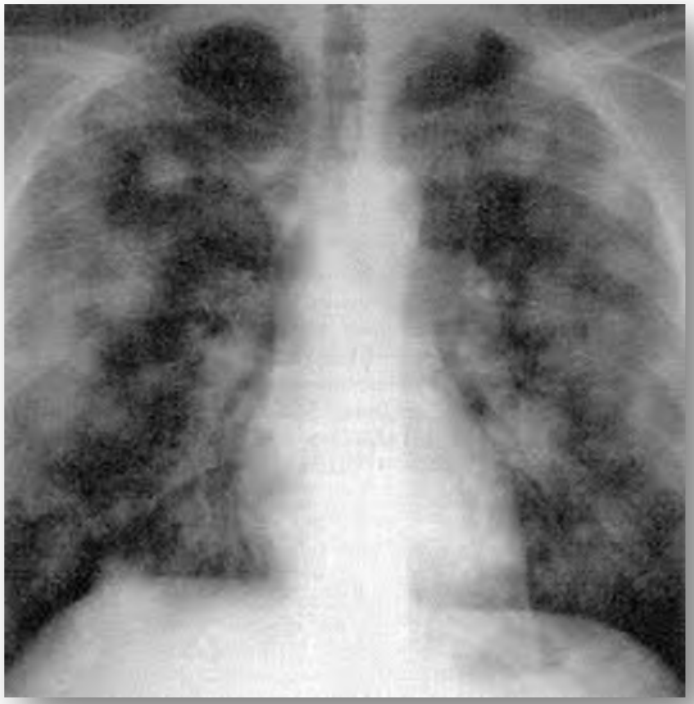


Emerging PNW Infection: *Coccidioidomycosis*

Coccidoides immitis

- Most common presentation:
  - ✓ <u>Community-Acquired Pneumonia</u>
    - ➢ Very similar to Pneumococcus
    - ➢ Acute, often self-limited
    - ➢ Sometimes called “Valley fever”
  - ✓ Immune response may trigger erythema nodosum, arthralgias (“Desert Rheumatism”)


150,000
INFECTIONS OF VALLEY FEVER OCCUR
IN THE SOUTHWESTERN U.S. EACH YEAR



Emerging PNW Infection: *Coccidioidomycosis*

Coccidoides immitis

- Less common presentation: <u>Dissemination</u>
- Skin... Abdomen... GU tract... Bones... CNS...
- Risk factors:
  - ✓ non-Caucasian
  - ✓ Pregnant
  - ✓ Immunocompromised

Valley fever: The effect and costs on the prison system

INFECTIONS

200

Estimated number of inmates who are sickened each year by valley fever.

ANNUAL COSTS

$12 million Guarding cost while in hospital.

$9 million Contracted for hospital care.

$2.4 million Cost for antifungals.

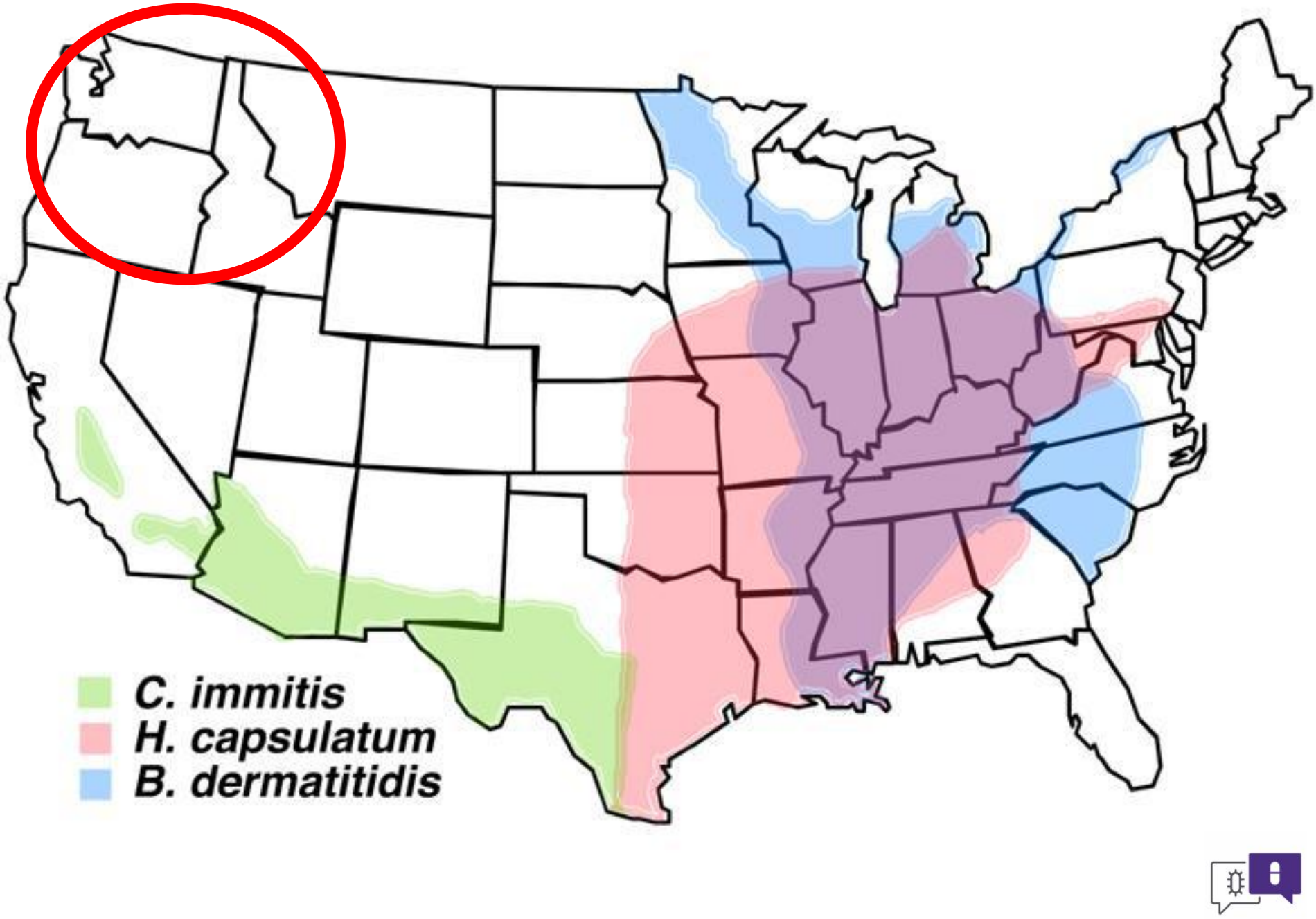
$23,000 - $29,000
The median cost per patient.

PRISONS

1. **Pleasant Valley State Prison**
2. **Avenal State Prison**
3. **Corcoran State Prison**
4. **California Substance Abuse Treatment Facility**
5. **Kern Valley State Prison**
6. **North Kern State Prison**
7. **Wasco State Prison**
8. **California Correctional Institution** (Tehachapi)

Sources: California Correctional Health Care Services Public Health Unit and Quality Management

CHRISTINE BEDELL and KENT KUEHL / THE CALIFORNIAN


C. immitis
H. capsulatum
B. dermatitidis

Outbreak of Coccidioidomycosis in Washington State Residents Returning from Mexico

Lisa Cairns,[1,3] David Blythe,[1,2] Annie Kao,[4] Demosthenes Pappagianis,[5] Leo Kaufman,[4] John Kobayashi,[1] and Rana Hajjeh[4]

From the [1]Section of Communicable Disease Epidemiology, Washington State Department of Health, and [2]University of Washington School of Public Health and Community Medicine Preventive Medicine Residency, Seattle, Washington; [3]Epidemic Intelligence Service, Division of Applied Public Health Training, Epidemiology Program Office, and [4]Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia; and [5]Department of Medical Microbiology and Immunology, School of Medicine, University of California at Davis, Davis, California

In July 1996 the Washington State Department of Health (Seattle) was notified of a cluster of a flulike, rash-associated illness in a 126-member church group, many of whom were adolescents. The group had recently returned from Tecate, Mexico, where members had assisted with construction projects at an orphanage. After 1 member was diagnosed with coccidioidomycosis, we initiated a study to identify further cases. We identified 21 serologically confirmed cases of coccidioidomycosis (minimum attack rate, 17%). Twenty cases (95%) occurred in adolescents, and 13 patients (62%) had rash. Sixteen symptomatic patients saw 19 health care providers; 1 health care provider correctly diagnosed coccidioidomycosis. *Coccidioides immitis* was isolated from soil samples from Tecate by use of the intraperitoneal mouse inoculation method. Trip organizers were unaware of the potential for *C. immitis* infection. Travelers visiting regions where *C. immitis* is endemic should be made aware of the risk of acquiring coccidioidomycosis, and health care providers should be familiar with coccidioidomycosis and its diagnosis.

Clinical Infectious Diseases 2000

Coccidioidomycosis Acquired in Washington State

Nicola Marsden-Haug,[1] Marcia Goldoft,[1] Cindy Ralston,[2] Ajit P. Limaye,[4] Jimmy Chua,[3] Heather Hill,[2] Larry Jecha,[2] George R. Thompson III,[5] and Tom Chiller[6]

[1]Office of Communicable Disease Epidemiology, Washington State Department of Health, Shoreline, [2]Communicable Disease Program, Benton-Franklin Health District, and [3]Infectious Diseases Department, Kennewick General Hospital, Kennewick, and [4]Division of Allergy and Infectious Diseases, University of Washington, Seattle, Washington; [5]Coccidioidomycosis Serology Laboratory, University of California, Davis; and [6]Mycotic Diseases Branch, Centers for Disease Control and Prevention, Atlanta, Georgia

Clinical, laboratory, and epidemiologic evidence suggest that 3 individuals with acute coccidioidomycosis were exposed in Washington State, significantly beyond previously identified endemic areas. Given the patients' lack of recent travel, coccidioidomycosis was not suspected, leading to delays in diagnosis and appropriate therapy. Clinicians should be aware of this possibility and consider the diagnosis.

Keywords. *Coccidioides*; coccidioidomycosis; endemic fungi; Washington

using DNA probe of fungal cultures [5] and enzyme immunoassay. The University of California, Davis (UCD) Coccidioidomycosis Serology Laboratory and the Centers for Disease Control and Prevention Mycotic Diseases Branch performed confirmatory testing by immunodiffusion to detect early immunoglobulin M (IgM) tube precipitin (IDTP) and complement fixation (CF) immunoglobulin G (IgG) antibodies (IDCF), with quantitative IgG titers. UCD identified 1 isolate as *C. immitis* by polymerase chain reaction amplification and sequencing of the serine proteinase gene [6].

CASE REPORTS

Case 1

A 12-year-old boy developed chest pain on 1 June 2010. Outpatient chest radiography (CXR) 2 days later was clear. Three days later, CXR to evaluate worsening chest pain, fever, and difficulty breathing revealed right lower lobe parenchymal infiltrate and pleural effusion. The patient was admitted, prescribed vancomycin and ceftriaxone for pneumonia and azithromycin for erythema multiforme, then discharged 6 days later on oral amoxicillin/clavulanate.

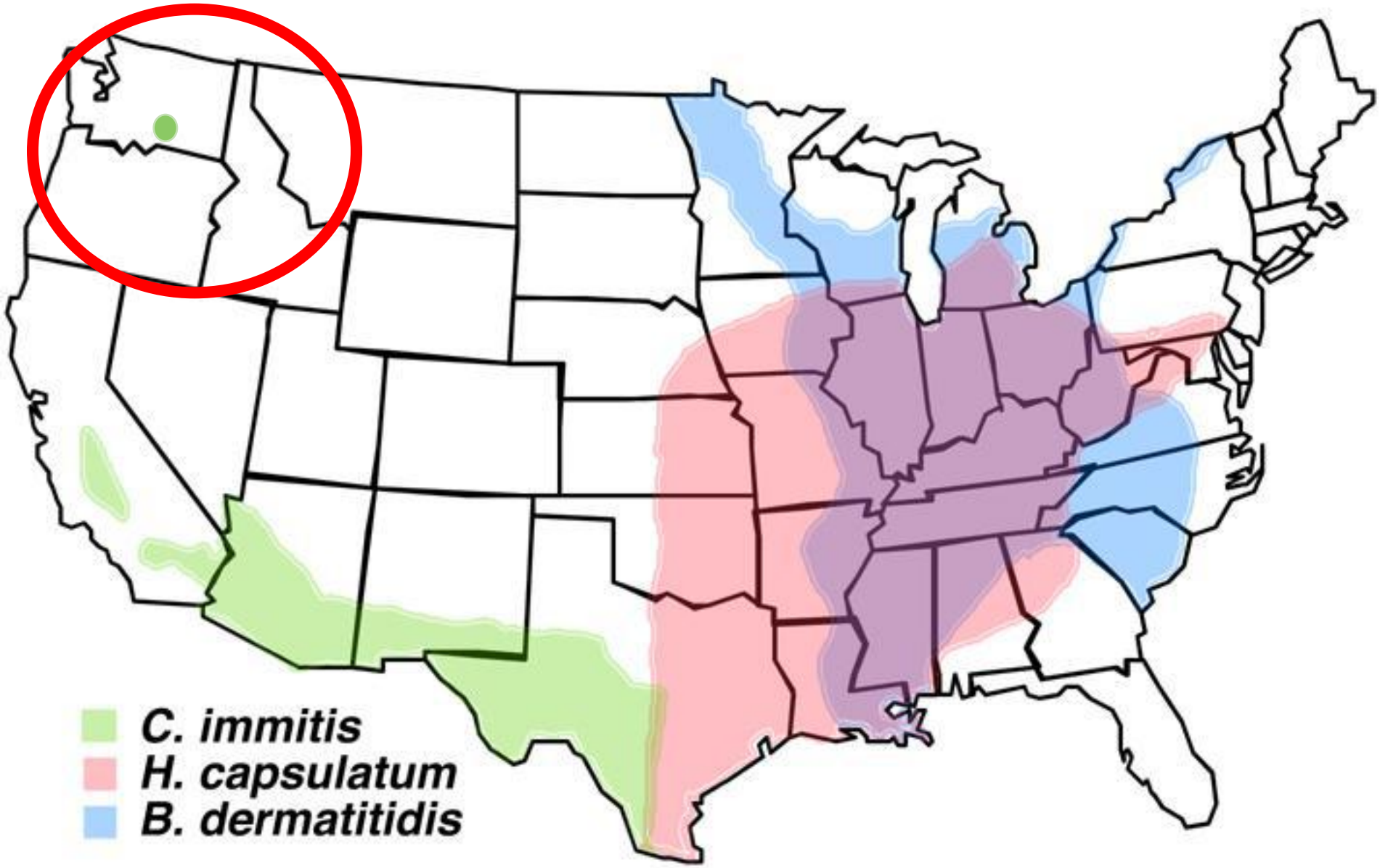
Emerging PNW Infection: *Coccidioidomycosis*

Coccidioides immitis

EMERGING IN WASHINGTON STATE

✓ 3 cases reported by Chua et al *Clin Infect Dis* 2013, MMWR 2014. Absent any convincing travel history… *significant delays* in establishing diagnosis

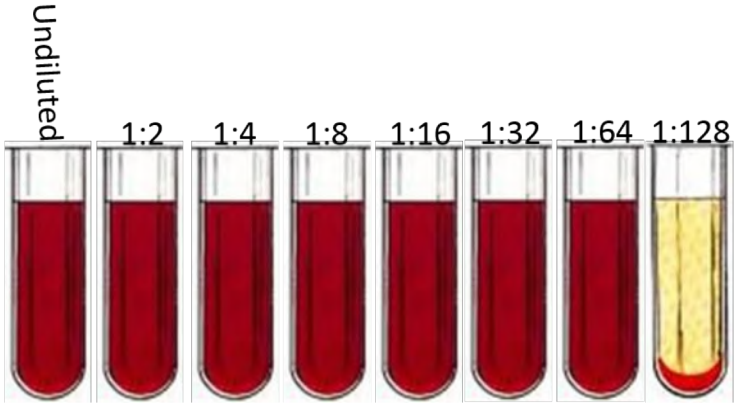
✓ Consider coccidio in pneumonia, FUO, wound infections that fails to respond to usual treatment in Eastern WA.

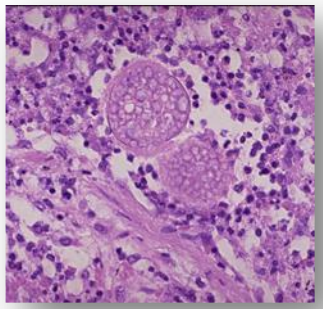

C. immitis
H. capsulatum
B. dermatitidis

Emerging PNW Infection: *Coccidioidomycosis*

Coccidoides immitis

- Diagnosis
  - ✓ Your Clinical Suspicion!
  - ✓ Acute, Mild
    - ➢ Serology may help
  - ✓ Severe (disseminated, lung damage)
    - ➢ BAL for culture
    - ➢ Tissue for culture and pathology

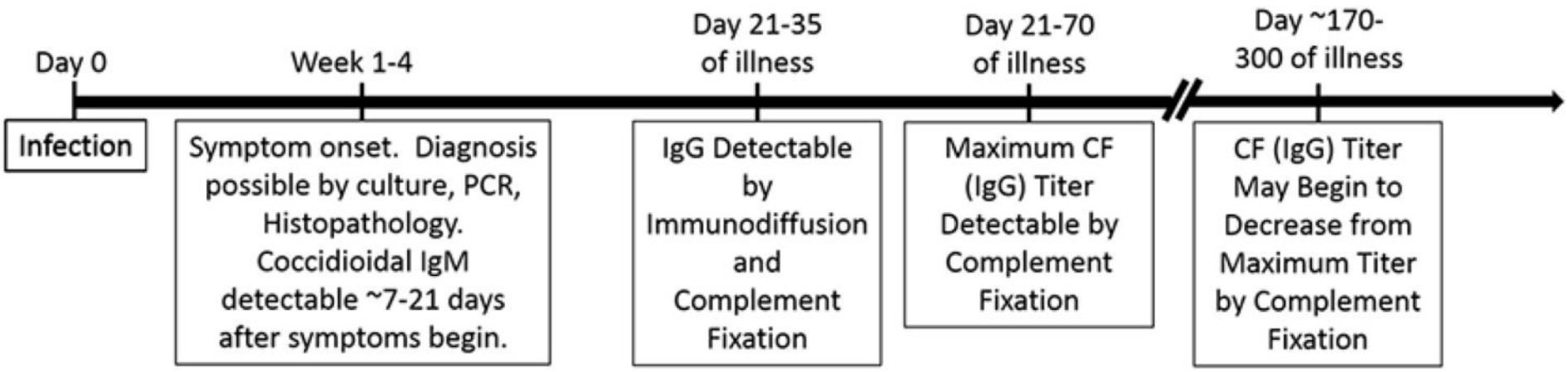




Emerging PNW Infection: *Coccidioidomycosis*

Coccidoides immitis

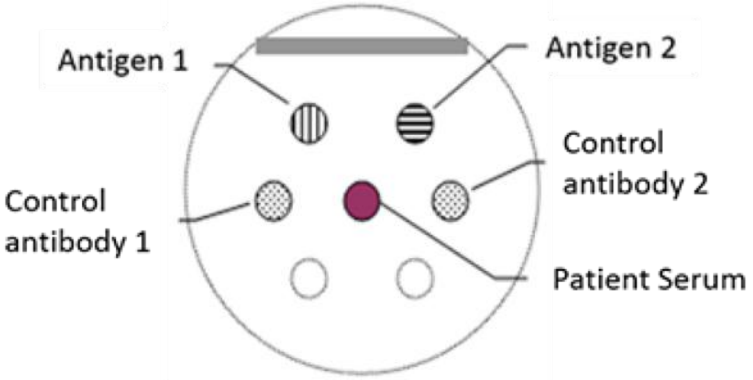
- Serologic Timeline

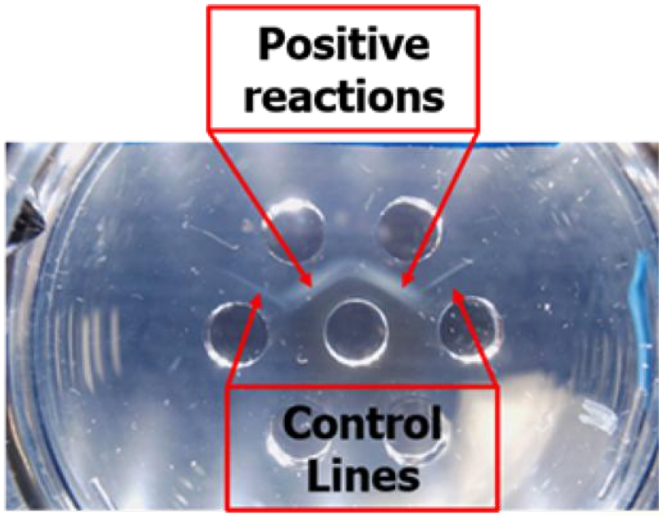


Emerging PNW Infection: *Coccidioidomycosis*

Coccidoides immitis

- Serology Options
  - ✓ Acute: IgM Immunodiffusion
    - ➢ NPV **problematic**... helpful if positive, but push for tissue if negative!

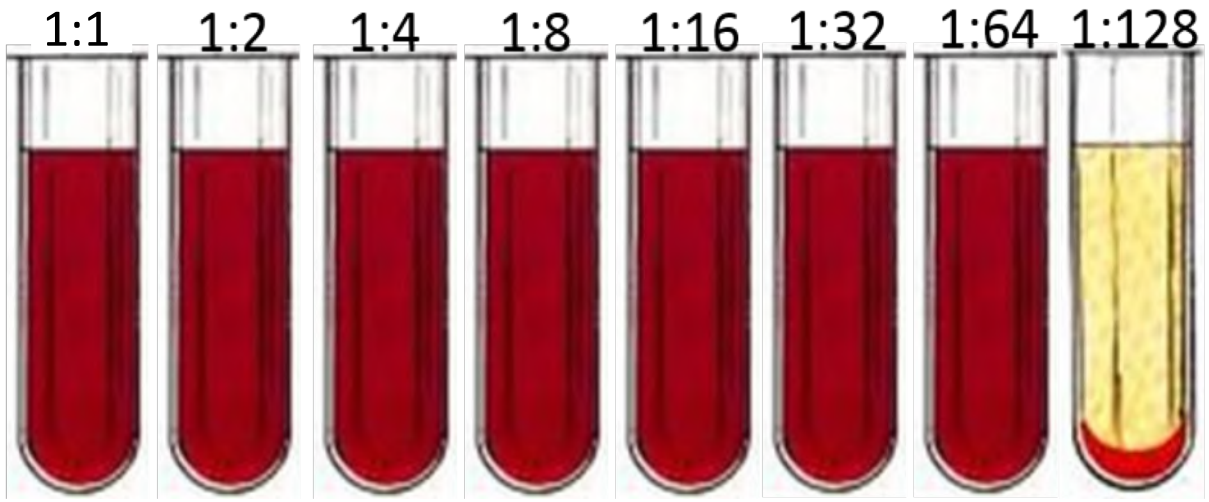




Emerging PNW Infection: *Coccidioidomycosis*

Coccidoides immitis

- Serology Options
  - ✓ <u>Chronic:</u> IgG Complement Fixation
    - ➢ Can be used to monitor **response** to therapy



Emerging PNW Infection: *Coccidioidomycosis*

Coccidoides immitis

- Treatment

Mild Valley Fever, "normal host:" No antifungals necessary, but follow closely

Risk of complications, or severe infection: Fluconazole 400mg PO daily x 3-6 **months**

"Severe" infection: Consider **Ambisome**, and step down to long Fluconazole **suppression**

Conclusions: *Coccidioidomycosis*

- Environmental fungal infxn
- Masquerades as CAP... may disseminate if immunosuppressed
- Now in Eastern WA!
- Diagnose with serology if mild disease... go for tissue if pt sick!
- Treat with flucon if mild, ambisome if severe