

# History and Epidemiology of Valley Fever

## *Symposium on Lung Infections*

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10/29/2019

## Overview of the Talk

- History of the disease
- Geographic distribution and projections
- Epidemiologic update in California
- Projected costs of the disease

## First Recorded Case of Valley Fever



Argentina, 1892

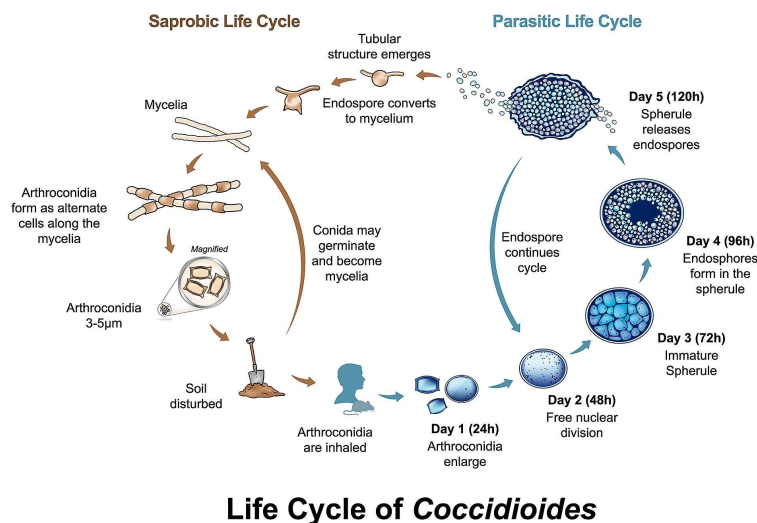
## Highlights of the History and Understanding of Valley Fever

- 1893: first case in California, laborer from the SJV
- 1900: organism identified as a fungus that fulfilled Koch's postulate
  - Confirmed the dimorphic nature of the fungus and its transition
- 1914-24: first serologic studies and skin test reactivity
- 1920-30: lung identified as the major portal of entry
- 1929: 2<sup>nd</sup> year medical student gets infected when he inhales spores from a culture of *Coccidioidomyces*. He survived and resolved (not a universally fatal disease)

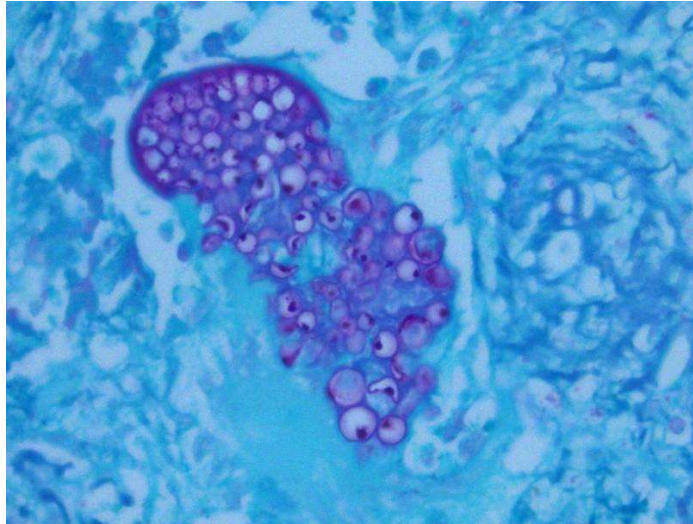
## Highlights of the History and Understanding of Valley Fever

- 1930-32 in Kern County:
  - Patients with “San Joaquin Valley Fever” all had positive skin tests to coccidioidin and a history of dust exposure
  - Black patients were at higher risk of dissemination
  - Cocci was isolated from the soil
- 1941-1944: significant data on military recruits sent to endemic areas

## Life Cycle of Coccidioides



## Coccidioides immitis in Tissue

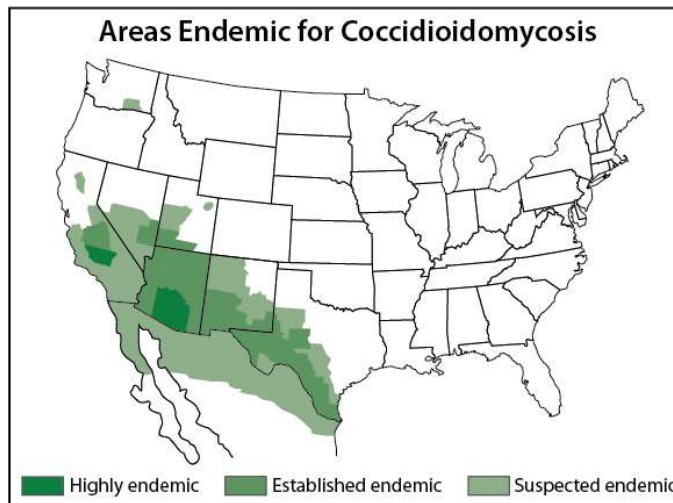


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## Geographic Distribution of Valley Fever

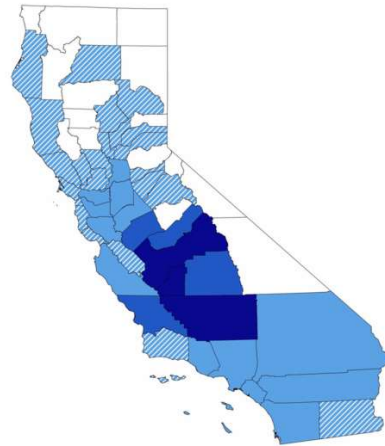


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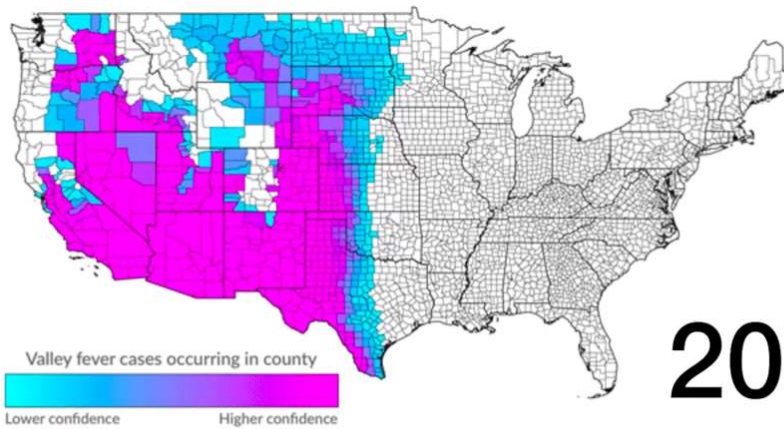
## Geographic Distribution of Valley Fever in California



Cases per 100,000 population  
 □ 0-9    ■ 10-19.9    ■ 20.0-74.9    ■ 75.0-304.0    □□ Potentially unreliable rate, relative standard error 25 percent or more

California Department of Public Health, 2011

## Predicted Future Geographic Distribution of Valley Fever

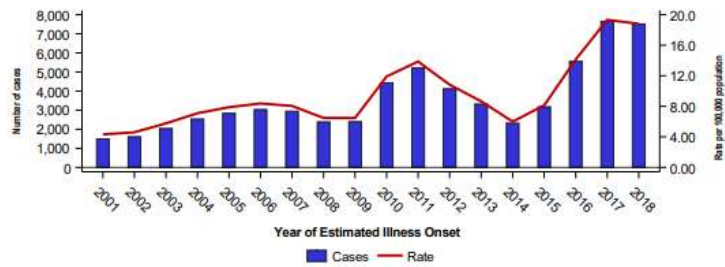


**2065**

Source: Morgan E. Gorris, "Expansion of coccidioidomycosis endemic regions in the United States in response to climate change"

# California Cases of Cocci by Year

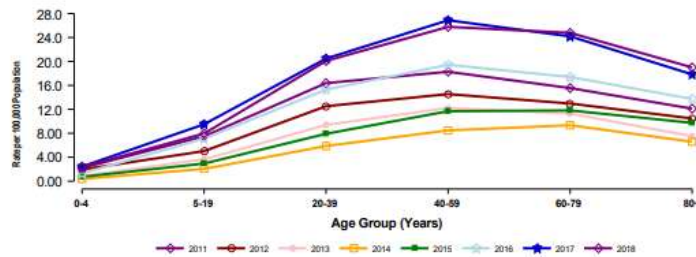
**Figure 1. Coccidioidomycosis Cases and Incidence Rates by Year of Estimated Illness Onset, California, 2001-2018**



California Department of Public Health

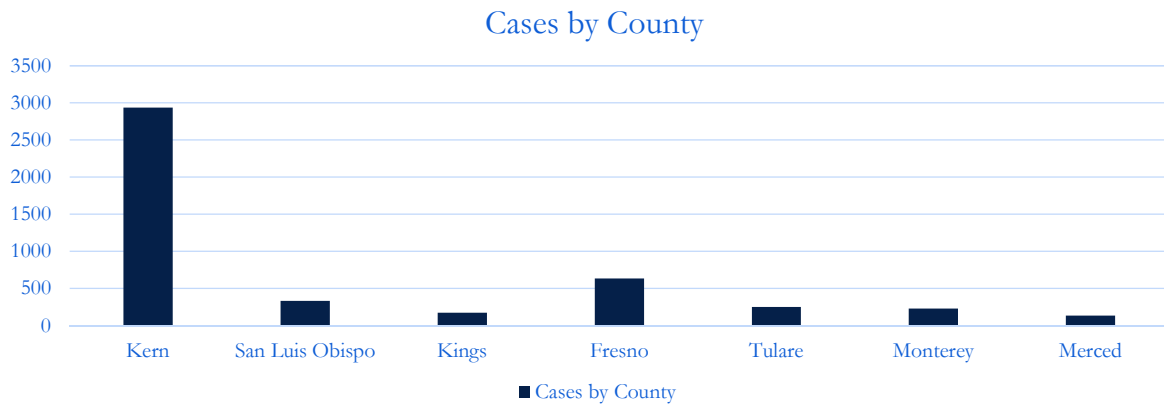
# Predicted Geographic Distribution of Valley Fever

**Figure 2. Coccidioidomycosis Incidence Rates by Age Group and Year of Estimated Illness Onset, California, 2011-2018**



California Department of Public Health

## Cases of Valley Fever by California County: 2018



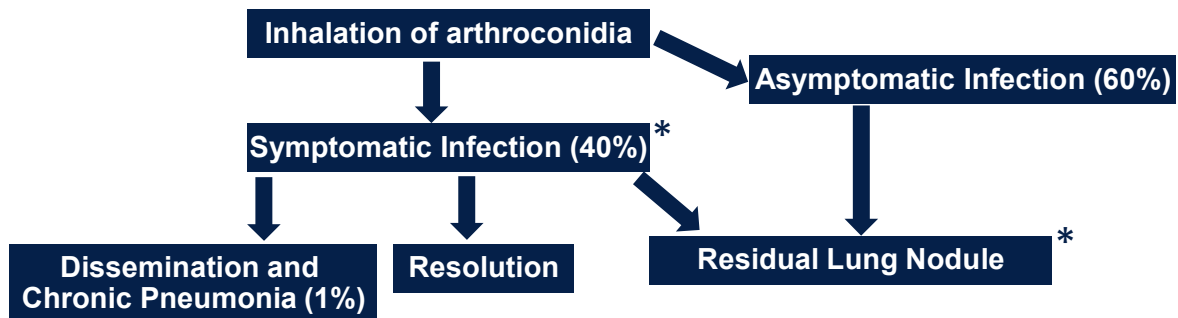
## Costs Associated with Valley Fever

**Table 2.** Estimated total direct and indirect lifetime costs, stratified by types of costs and coccidioidomycosis (CM) disease manifestation, for incident CM cases in 2017 ( $n = 7466$ ) in California.

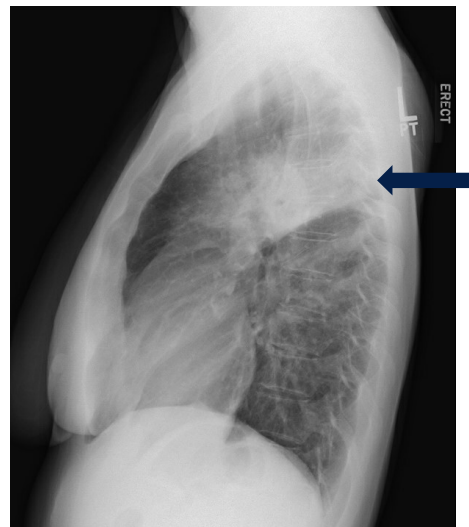
CM Disease Manifestation	Number ( $n = 7466$ )	Average Per Person Lifetime Cost	Total Lifetime Cost for California
<b>Direct costs</b>			
Uncomplicated pneumonia	6346	\$22,039	\$139,859,494
Diffuse/chronic pneumonia without dissemination	187	\$132,416	\$24,761,792
Dissemination, including meningitis	187	\$1,023,730	\$191,437,510
Other changes in chest, pulmonary nodules	522	\$95,399	\$49,798,278
Other changes in chest, pulmonary cavity	224	\$101,748	\$22,791,552
<b>Indirect costs</b>			
Uncomplicated pneumonia	6346	\$931	\$5,908,126
Diffuse/chronic pneumonia without dissemination	187	\$350,063	\$65,461,781
Dissemination, including meningitis	187	\$562,291	\$105,148,417
Other changes in chest, pulmonary nodules	522	\$126,883	\$66,232,926
Other changes in chest, pulmonary cavity	224	\$126,883	\$28,421,792
<b>Total costs of CM</b>			
Direct costs			\$428,648,626
Indirect costs			\$271,173,042
Work loss			\$11,825,936
Disability			\$4,156,449
Mortality			\$255,190,657
Total direct + indirect costs			\$699,821,668

Wilson, L. *et al*, Int J Environ Res Public Health, 2019

## Clinical Course of the Disease



## Acute Respiratory Infection

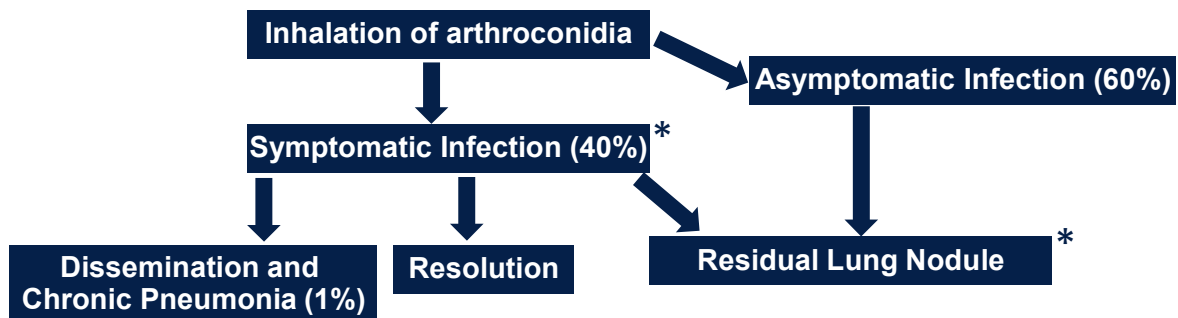




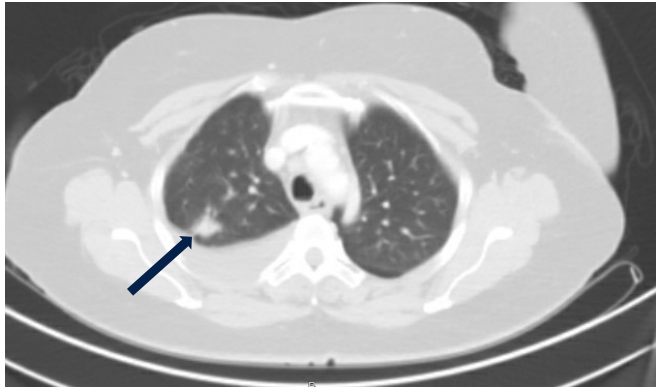
## Acute Respiratory Infection

- Typical symptoms
  - Fevers, chills, night sweats
  - Cough: productive and non-productive
  - Fatigue and lassitude
- Persist for days to weeks
- Do not respond to empiric antibiotics for Community-Acquired Pneumonia

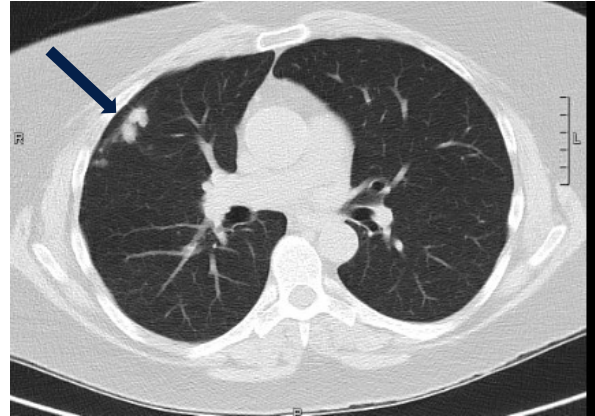
## Clinical Course of the Disease



## Lung Cancer versus Valley Fever



57 yo nonsmoking woman



56 yo nonsmoking woman

## Conclusions

- Valley Fever has been recognized for 125 years
- Much of our understanding of risk and epidemiology dates to 75-100 years ago
- The Central Valley, Salinas Valley and Mojave Desert regions of California are endemic
- Climate change is predicted to lead to substantial increase in the endemic region and populations at risk
- Clinical presentation is not unique and diagnosis requires appropriate diagnostic reasoning by the clinician