



Valley Fever
Institute
at Kern Medical

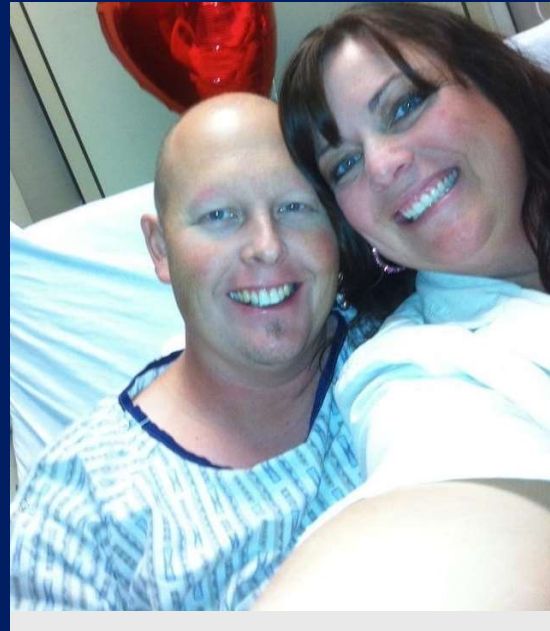
Clearing the Air

Rob Purdie
Patient & Program Development Coordinator

September 23, 2021

First Year of Valley Fever

- ✓ Symptoms began ~ 1/1/2012
- ✓ Diagnosed ~ 2/2012
- ✓ Discharged ~ 3/5/2012
- ✓ Headache almost gone ~ 5/2012
- ✓ Hospitalized for drug failure~ 10/2012



Treatments

Failed Medications

- ✓ Fluconazole Monotherapy ~ 10/2012
- ✓ Itraconazole Monotherapy ~ 1/2013
- ✓ Voriconazole Monotherapy ~ 6/2013
- ✓ Voriconazole & Intrathecal Amphotericin ~ 6/2014
(Clinically successful but failed 2x)

Current Medications

- Posaconazole & Intrathecal Amphotericin since 12/2015



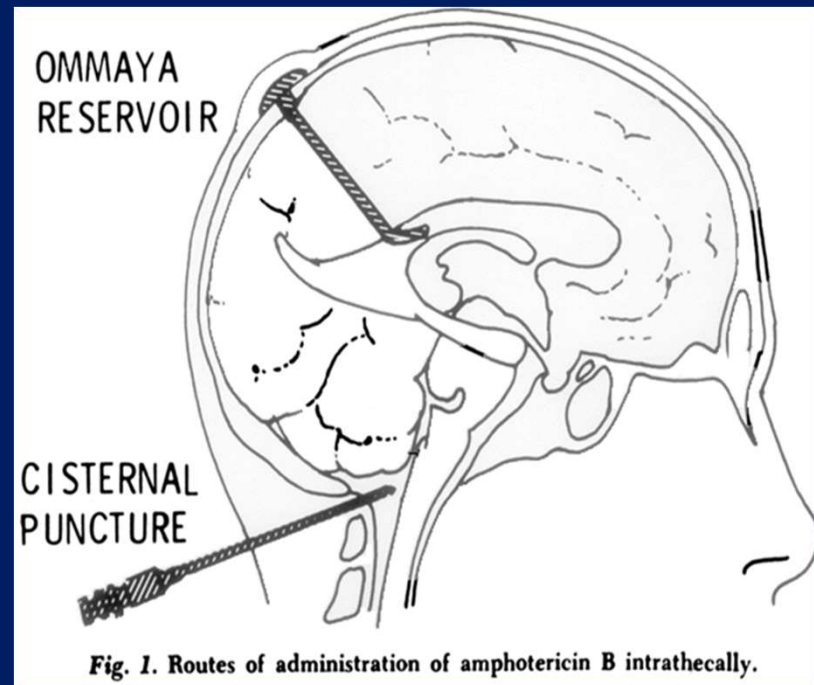
Complications of Intrathecal Treatment

Drug Related

- ✓ Nausea, vomiting
- ✓ Headache
- ✓ Cranial Neuropathy
- ✓ Balance & Gait problems

Procedure Related

- ✓ Infection
- ✓ Hemorrhage
- ✓ Brain puncture



The Burden of Disease

Direct Cost

- ✓ Hospitalization
- ✓ Procedures
- ✓ Treatment
- ✓ Testing

Indirect Cost

- ✓ Missed work or school
- ✓ Deteriorated relationships
- ✓ Depression & isolation
- ✓ Disability



Patient & Program Coordinator

Valley Fever Institute Patients

- ✓ Onboard New Patients
- ✓ Assist with Patient Navigation
- ✓ Patient Support Group

Advocacy & Education

- ✓ Collaborate with Community Stakeholders
- ✓ Community Events
- ✓ Occupation Health Education



The Valley Fever Institute

- ✓ Public Education
- ✓ Patient Education
- ✓ Professional Education
- ✓ Patient Centered Care
- ✓ Patient Centered Research



Topics

- ✓ Valley Fever & how it is contracted
- ✓ Signs & symptoms of Valley Fever & COVID-19
- ✓ Early detection, diagnosis, & treatment
- ✓ Treatment & prognosis for Valley Fever
- ✓ Personal risk factors
- ✓ Seeking testing & medical attention
- ✓ Mitigation and the expanding impact of the disease
- ✓ High risk areas, work & environmental conditions
- ✓ Exposure prevention of Valley Fever & COVID-19
- ✓ Current and historical efforts to protect workers from Valley Fever

Education & Training

Studies have shown those who are aware of Valley Fever are diagnosed sooner



State of California - AB203

Added Section 6709 to the Labor Code Effective May 1, 2020



National Institute for Occupational Safety and Health

National Occupational Research Agenda (NORA) Construction Sector Council

What is Valley Fever?

The common name for:

- ✓ Coccidioidomycosis or “Cocci”

A Fungus

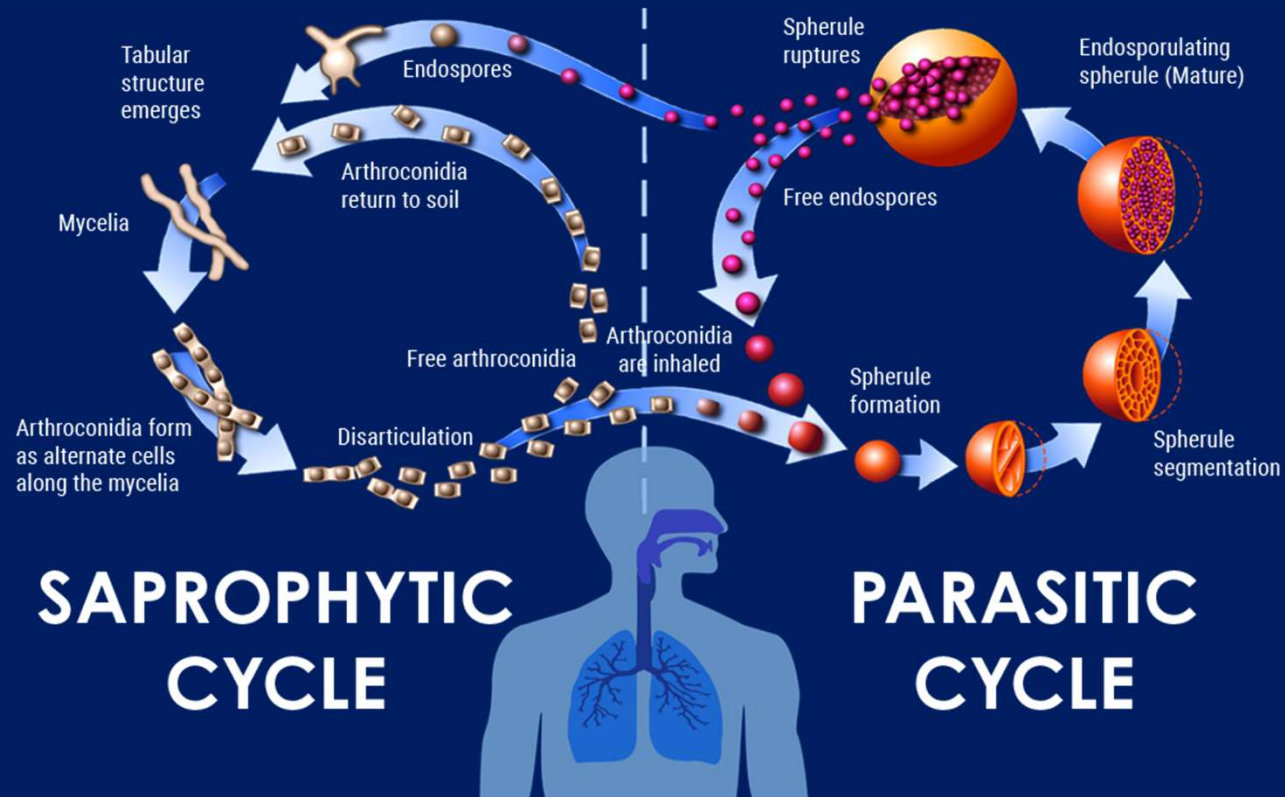
- ✓ Found sporadically in the soil of the Southwestern United States, Mexico, Central and South America.

An Infection

- ✓ Caused by inhaling the fungus



Morphology of Coccidioides



Coccidioides



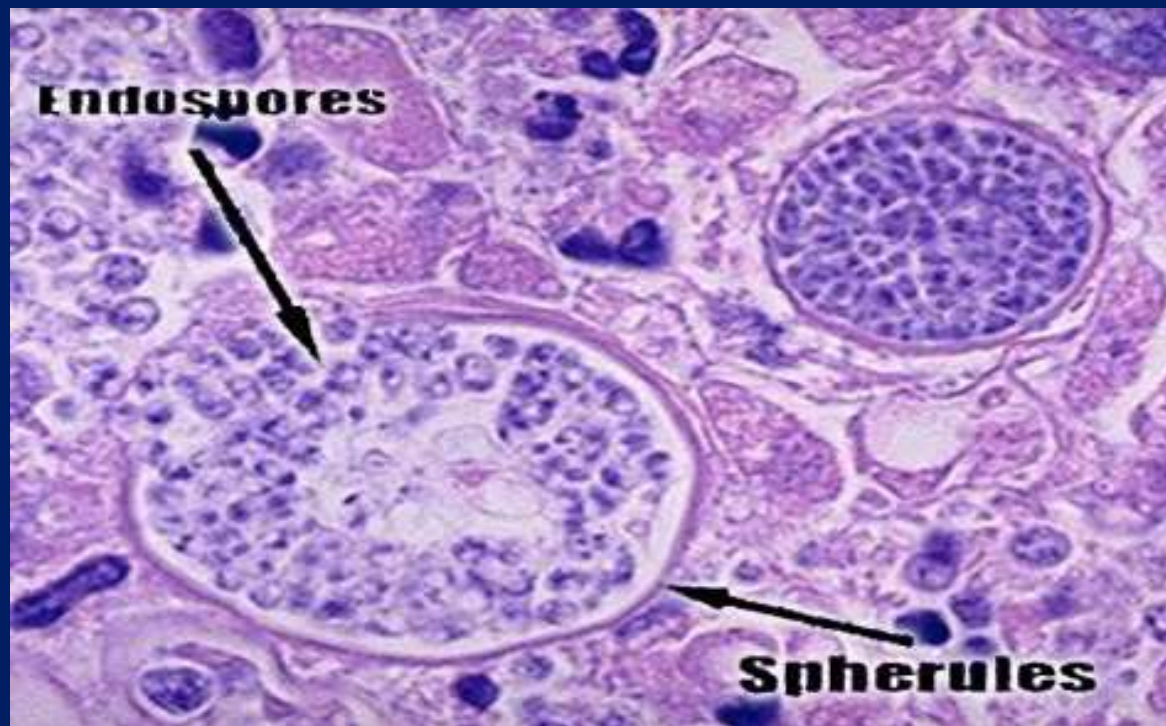
Mycelia

Coccidioides

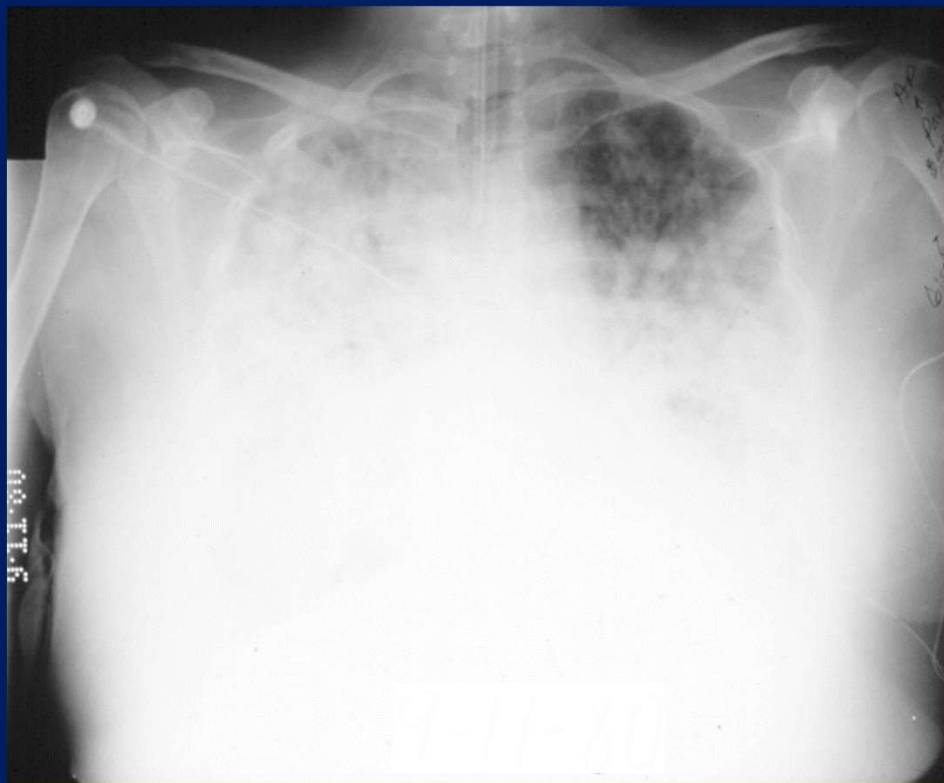


Arthroconidia

Coccidioidomycosis



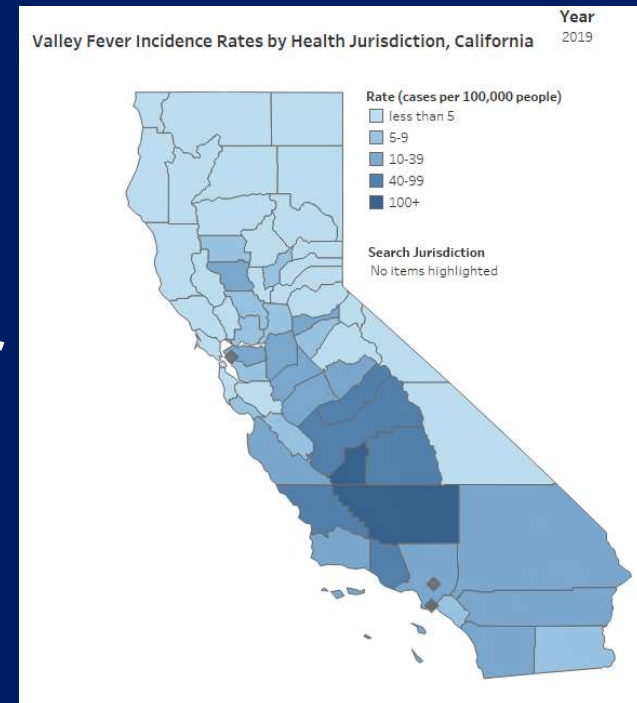
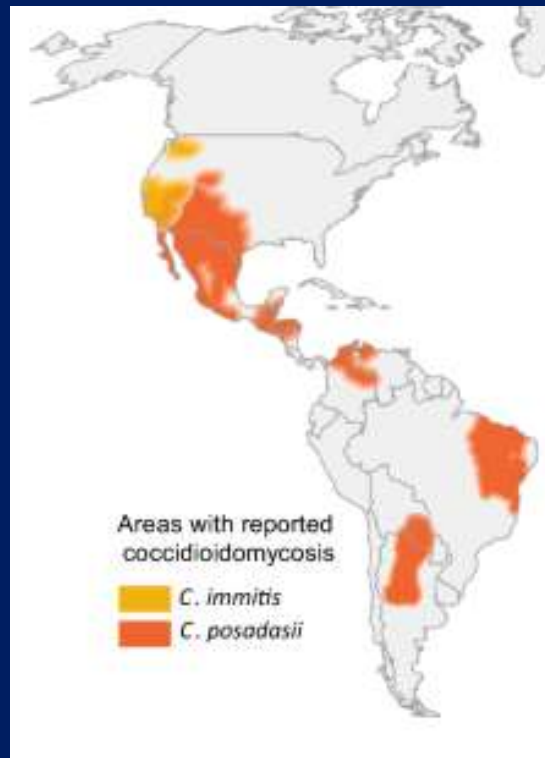
Coccidioidomycosis



ARDS

Who is at Risk?

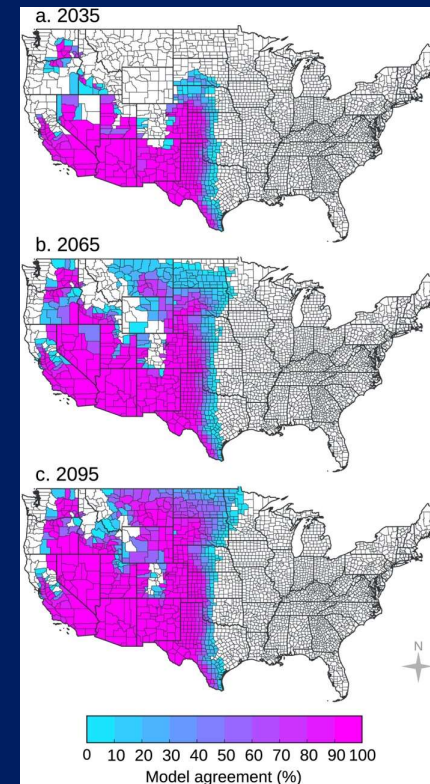
**Anyone
can get
Valley Fever**



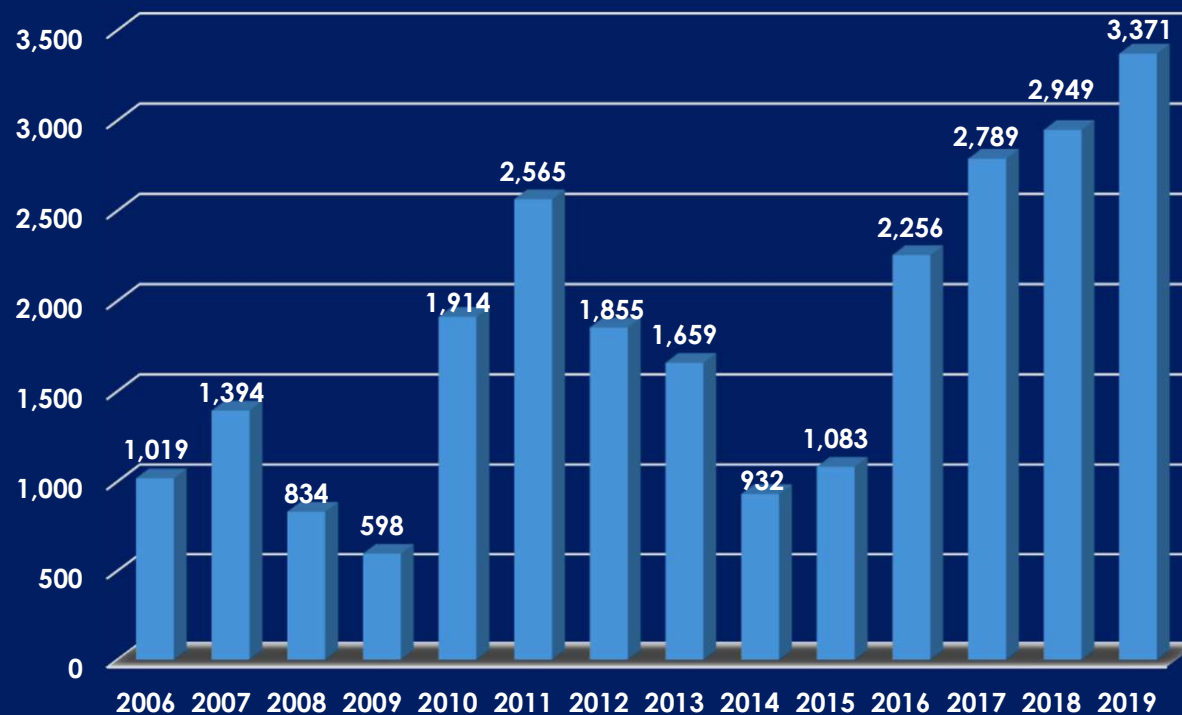
Who is at Risk?

Recent studies have forecasted a growth in the geographic area at risk as well as an increase in cases over the next 75 years

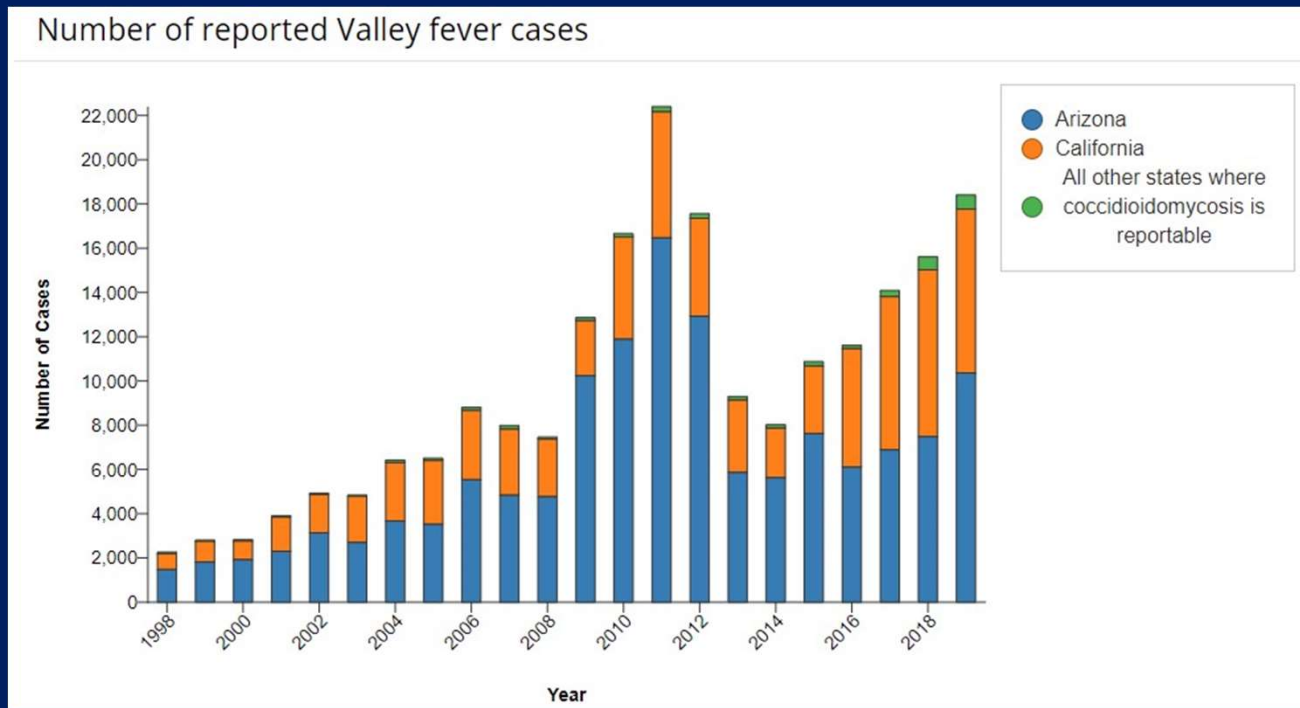
Gorris, Morgan E et al. "Expansion of Coccidioidomycosis Endemic Regions in the United States in Response to Climate Change." *GeoHealth* vol. 3,10 308-327. 10 Oct. 2019, doi:10.1029/2019GH000209



Reported Cases in Kern County



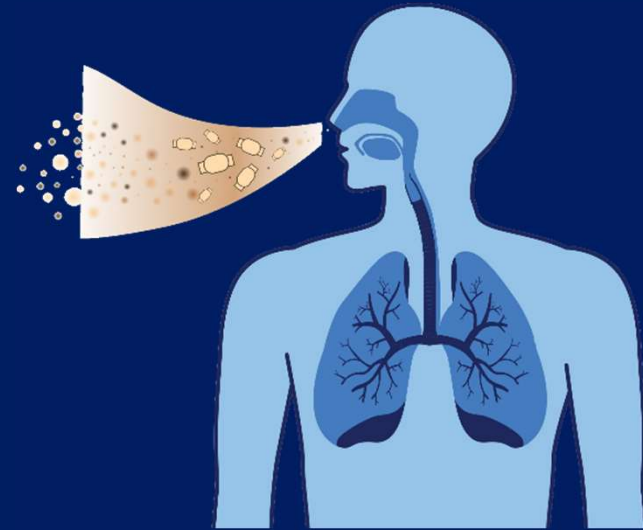
Reported Cases of Valley Fever



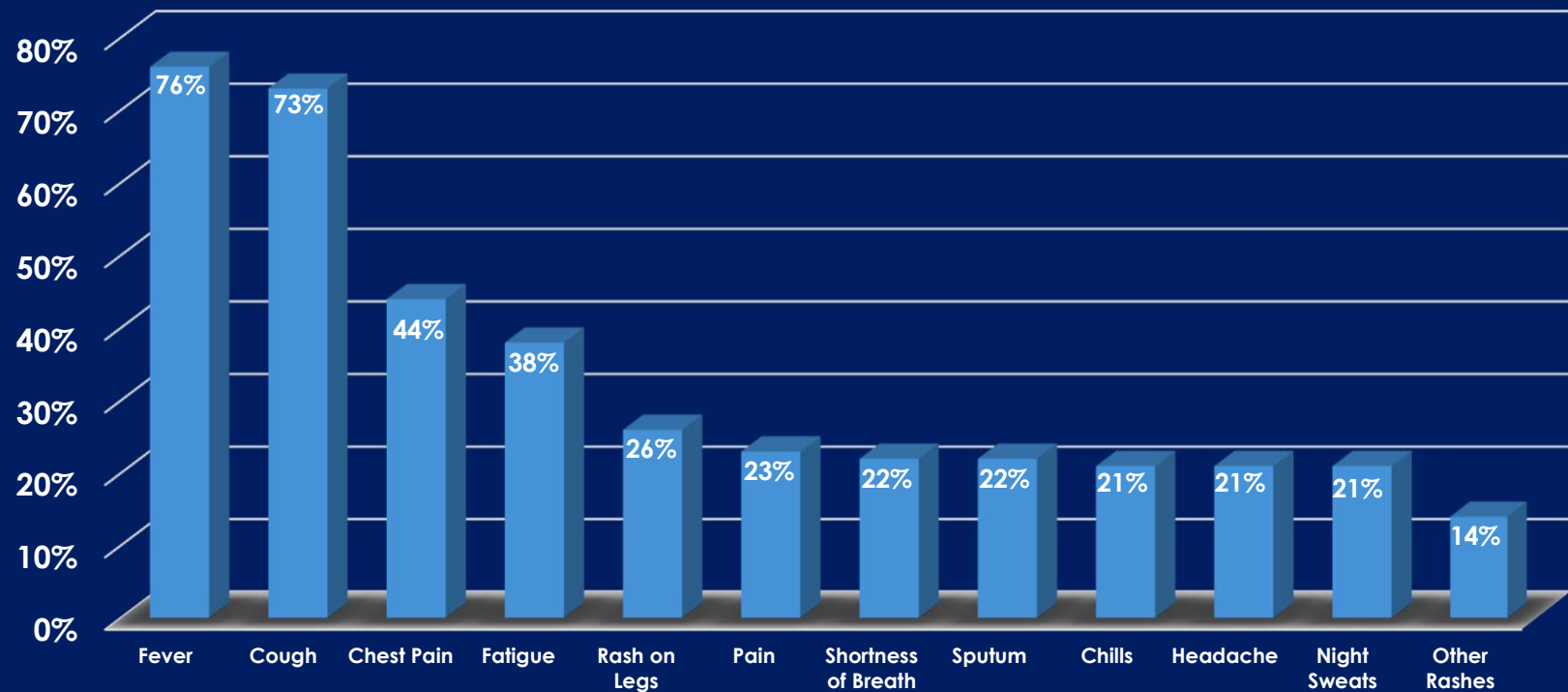
<https://www.cdc.gov/fungal/diseases/coccidioidomycosis/statistics.html>

Incubation Period

- ✓ Symptoms may appear 1-4 weeks after exposure
- ✓ Average onset is 10-16 days
- ✓ In endemic areas, 30% of pneumonia is believed to be caused by Valley Fever



Symptom Prevalence



Source: Johnson, Cocci: Proceedings of 5th International Conference, 1996; 347-58.

A Triple Threat

Cocci, COVID-19 & Flu

- ✓ Respiratory symptoms are among the most common reason patients seek medical attention
- ✓ We are currently amid a historic SARS-CoV-2 pandemic
- ✓ We are approaching the start of a new flu season of unknown severity

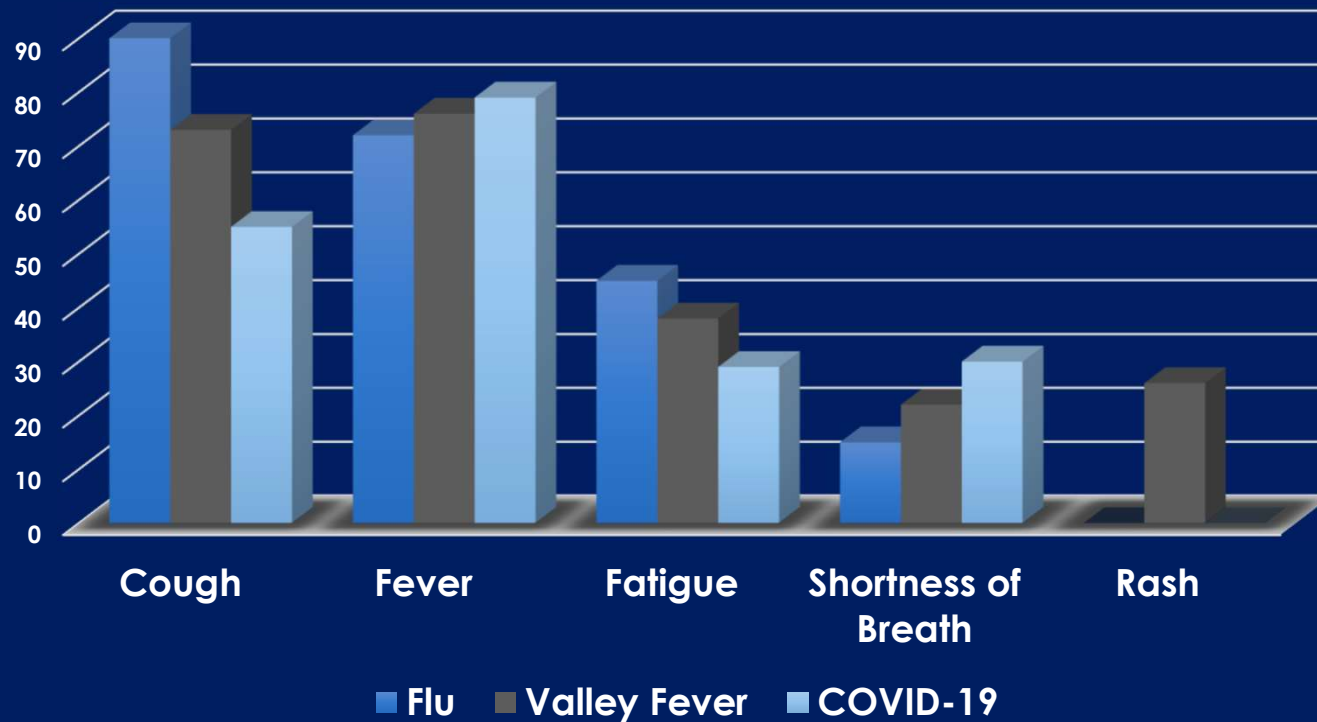


A Triple Threat

Respiratory symptoms are among the most common reasons patients seek medical attention

- ✓ In 2018, the most common diagnosis code for Emergency Department encounters in California was, "Acute Upper Respiratory Infection, unspecified".
- ✓ Many respiratory illnesses have similar symptoms
- ✓ Valley Fever is always a possible diagnosis

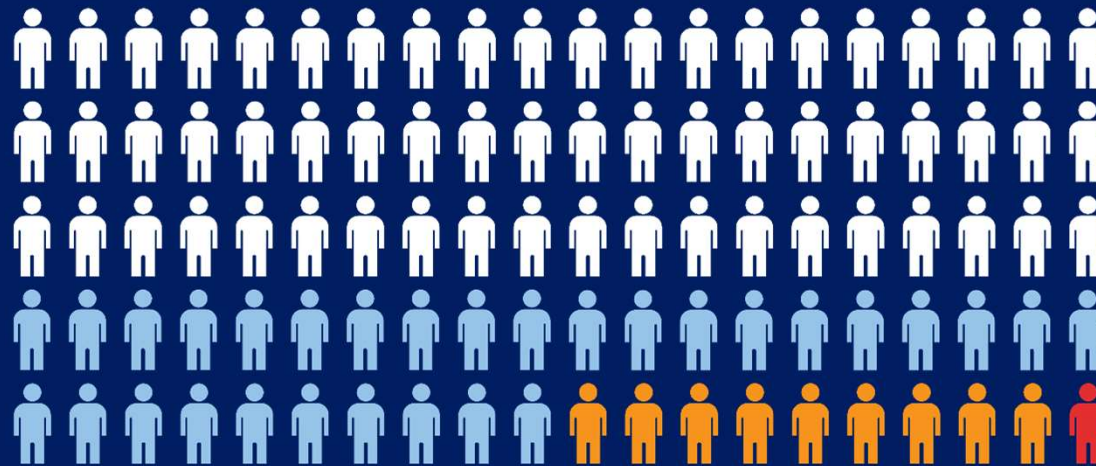
Common Symptoms



A Triple Threat

Respiratory Infections			
	Flu	COVID-19	Valley Fever
Seasonality	November – April	March 2020 – Present	June – December
Transmission	Person to Person	Person to Person	Not Person to Person
Incubation	3 days	5-6 days	1 – 4 weeks
Kern County Deaths/100k	0.8	50+	1.3

How likely are you to get Valley Fever?



60%  Inhaled Valley Fever Spore & Have No Symptoms

40%  Inhaled Valley Fever Spore & Have Flu Resembling Pneumonia Illness

10%  Inhaled Valley Fever Spore & Have Diagnosed Valley Fever

1%  Inhaled Valley Fever Spore & Have Severe Pulmonary Infection or Disseminated Cocci

Source: Smith CE, *Varieties of Coccidioidal Infection in Relation to the Epidemiology and Control of the Disease*. *AMJ of Public Health*.

Hypothesis:

Valley Fever is an
immunogenic disease
with fungal implications

Royce H. Johnson, MD, FACP
NIAID 2019



Diagnosing Valley Fever

Blood tests must be ordered by a healthcare provider

- ✓ Initial test is negative in up to 50% of cases
- ✓ If negative, retest if symptoms continue



 ***Retesting should be done as long as symptoms are present***

Other Basis for Establishing a Diagnosis

Laboratory analysis

samples from biopsy or fluids

Imaging

X-Ray, CT, MRI

Skin test

Time Spent Outdoors

Occupational or recreational

Travel History



Testing for Valley Fever

Not all blood tests are created equal:

- ✓ Sensitivity & specificity affect diagnosis and treatment
- ✓ There is no standardization of tests from lab to lab

Kern County Public Health & UC Davis labs are the standards against which others should be measured

- ✓ Accurate & consistent tests ensure appropriate treatment

Retesting is needed to ensure a diagnosis is not missed

- ✓ Approximately 50% of initial tests are negative
- ✓ Most testing is antibody based

When to get Tested for Valley Fever

Have had symptoms for 10 days or longer

- ✓ Especially if COVID-19 negative

Before taking a second course of antibiotics

- ✓ Common pneumonias react to antibiotics

Have severe symptoms or lingering symptoms

Acute Valley Fever

- ✓ Most people with Valley Fever have moderate symptoms
- ✓ Healthy individuals usual recover in 3-6 months
- ✓ For some individuals, recovery is up to 1 year



Severity of initial disease does not correlate with likelihood of complications!



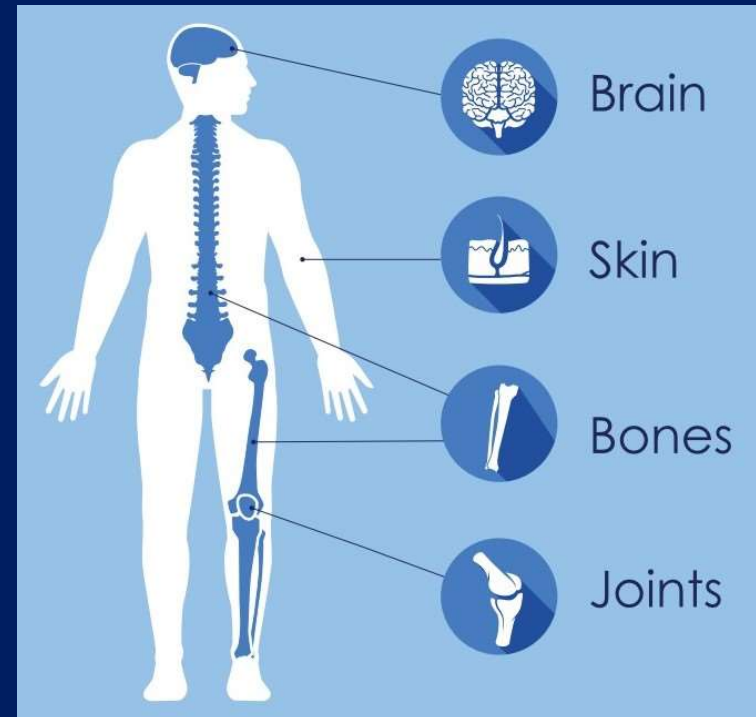
Chronic Valley Fever



- ✓ Severe & persistent pneumonia
- ✓ Progressive active infection
- ✓ Hole in lung (Cavities)
- ✓ Fluid Collection in the lining of the lung (Empyema)

Disseminated Valley Fever

- ✓ Happens when Valley Fever moves outside the lungs
- ✓ Signs & symptoms vary by location
- ✓ Common sites include:
Brain, Skin, Bones & Joints



Risk Factors of Disseminated Valley Fever

- ✓ 60 years & older
- ✓ Black or Filipino
- ✓ Pregnancy (especially – 3rd trimester and postpartum)
- ✓ Diabetes (especially if uncontrolled)
- ✓ Weakened Immune System (Immunodeficiency)

Risk Factors of Disseminated Valley Fever

- ✓ Weakened Immune System (Immunodeficiency)
 - Caused by illnesses or disease
 - Cancer, HIV or AIDS
 - Lupus or autoimmune diseases
 - Caused by medications or treatments
 - Steroids (Glucocorticoids)
 - Biologics (Immunomodulators)

Clinical Features & Factors Associated with Dissemination

FACTOR	OR	P-value
Highest CF titer ($\geq 1:64$)	5.96	0.000004
African American	8.42	0.00007
Age > 50 years	1.82	NS
Adenopathy CXR	1.96	NS
Neg Skin Test	3.85	0.008
Sex- Male	2.90	0.02
Alk Phos >200	3.48	0.009

Note: Includes patients presenting with dissemination that developed during 1-year follow-up.

Source: Johnson, Cocci: *Proceedings of 5th International Conference*, 1996; 347-58.

Reasons for Treatment



Acute or Chronic Valley Fever

- ✓ Illness is getting worse
- ✓ Lab Results (CF Titer)
- ✓ Length of Symptoms (more than 6 weeks)
- ✓ Patient Risk Factors
 - Race, Age, Health Issues

ALL Disseminated Valley Fever

Length of Treatment



Acute

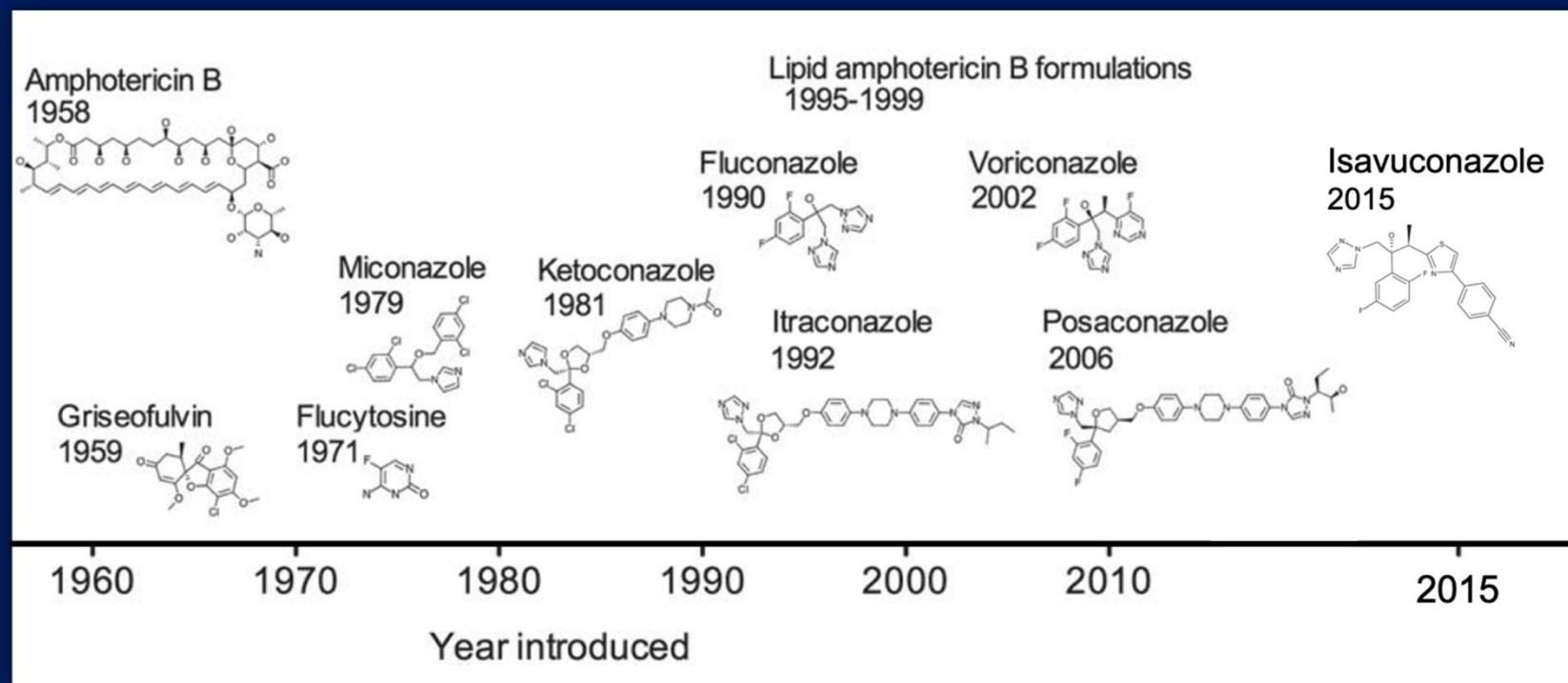
- ✓ 3-6 months
- ✓ Symptoms gone or almost gone
- ✓ Clear x-ray

Chronic or Disseminated

- ✓ 1-3 years or more
- ✓ Meningitis requires treatment for life

Monitor for 2 years after therapy is stopped

Development of Systemic Antifungal Drugs



Treatment Pioneer



Hans Einstein, MD

Available Medications

Drugs used to treat Valley Fever are used off label and do not kill the disease



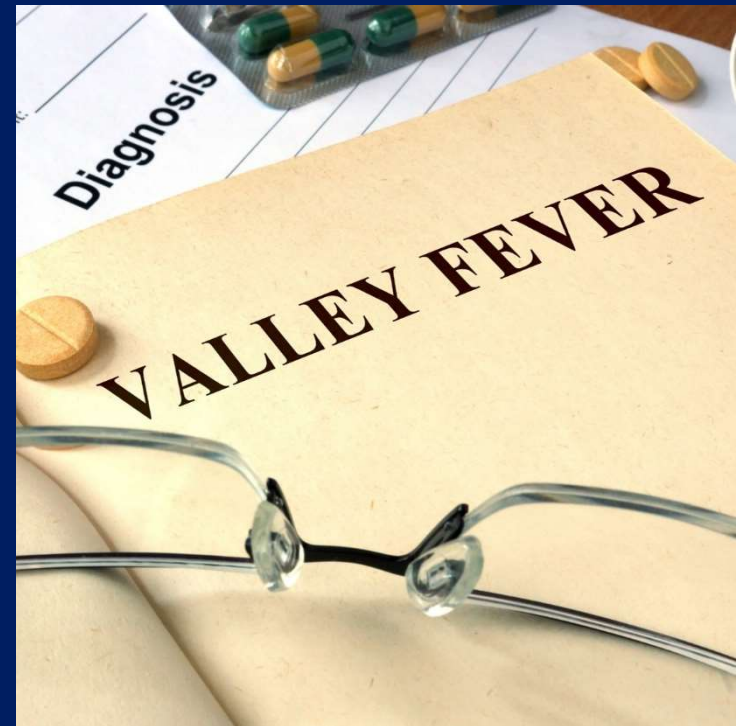
Polyenes

- ✓ Amphotericin B deoxycholate (Fungizone)
- ✓ Amphotericin B Liposomal (Ambisome)
- ✓ Amphotericin B Lipid Complex (ABLC, Abelcet)



Azoles

- ✓ Fluconazole
- ✓ Itraconazole
- ✓ Voriconazole
- ✓ Posaconazole
- ✓ Isavuconazonium



Economic Burden

Lifetime Cost of Cases Diagnosed in California in 2017: \$699,821,668

	Average Direct Cost	Average Indirect Cost	Average Total Cost	Average Work Loss
Acute Valley Fever	\$22,039	\$931	\$22,970	7 Days
Chronic Valley Fever	\$132,416	\$350,036	\$482,452	90 Days
Disseminated Valley Fever	\$1,023,730	\$562,291	\$1,586,021	120 Days

Vaccine

- ✓ Currently no FDA approved vaccines for ANY fungal disease
- ✓ Last Valley Fever vaccine trial for humans was in the 90's
- ✓ A Valley Fever vaccine for dogs is expected to be available in 2022



Sources of Infection

Most Common

- ✓ Inhaled airborne spores

Rare

- ✓ Contaminated materials (fomites)
- ✓ Direct injections (cutaneous)



Occupational Health Risk



AGRICULTURE



ENERGY



CONSTRUCTION

Valley Fever in the Workplace

1928 - California makes Coccidioidomycosis a reportable disease

1930 - First case of Valley Fever in Kern County to receive compensation for becoming infected while working

2010 - Valley Fever Lab Reportable in California

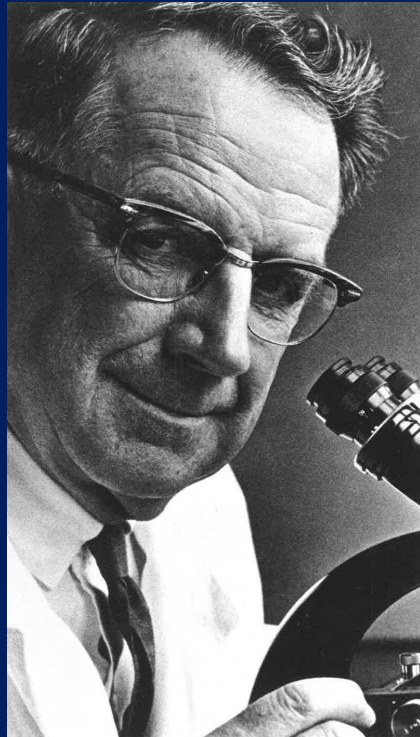
2018 - Lab only requirement for cases

2019 - Occupational Health Watch: Valley Fever Is a Work-Related Illness

Source: KernCountyValleyFever.com



Research Pioneer



CE Smith, MD

Valley Fever & the Military

Research During World War II

- ✓ Large population from outside the area
- ✓ Prevention focused on dust control
- ✓ Skin testing for exposure
- ✓ Availability of complete medical history



Clues Valley Fever may be in the Soil

- ✓ Natural or undisturbed soils
 - Upper 12 inches
- ✓ Sandy & well aerated soils with high salinity (Sandy Loam)
- ✓ Sparse vegetation
- ✓ Animal burrows
- ✓ Adjacent to dry streams



Clues Valley Fever may be in the Soil



High Risk Activities & Environments

- ✓ Working near natural or undisturbed soils
- ✓ Windy or dusty conditions
- ✓ Activities that disturb soil
 - Construction
 - Energy production
 - Archeological digging
 - Wildland firefighting



Valley Fever Outbreaks

- ✓ Dinosaur National Monument, Utah, 2001
- ✓ Construction Workers, Kern County, 2008
- ✓ Solar Project, San Luis Obispo County 2011-2014
- ✓ Film Crew, Ventura County, 2012
- ✓ Construction Volunteers, Mexico, 2018



Reduction Through Job Design

- ✓ Minimize dust generation/exposure
- ✓ Stay upwind of dust generating activities
- ✓ Wet soil before digging
- ✓ Enclosed Cab/HEPA filtrations
- ✓ Work Stoppage plan for excess dust/wind
- ✓ N-95 respirator*



*California Department of Public Health states bandanas, surgical face masks, and simple dust masks are NOT protective

Reduce your risk

Preventing Flu, COVID-19 & Valley Fever		
Flu	COVID-19	Valley Fever
Face Mask	Face Mask	N-95 Respirator
Maintain Physical Distancing (6 feet)	Maintain Physical Distancing (6 feet)	Work upwind of dust clouds
Hand washing	Hand washing	Wet down dusty areas before beginning work
Vaccination	Vaccination	Possible Vaccine?

Future Direction

✓ Training & Education

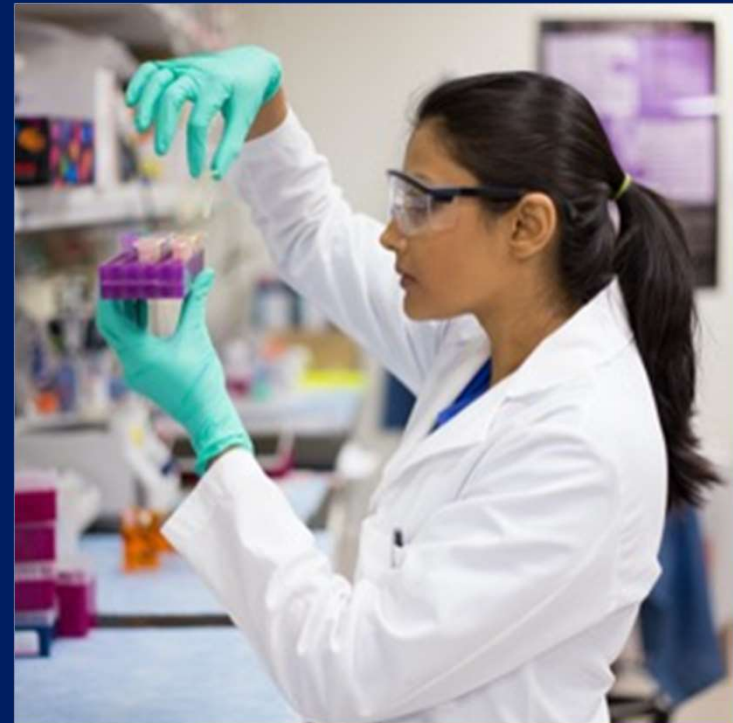
- ✓ At risk workers
- ✓ Outdoor workers

✓ Diagnostics

- ✓ Screening tests
- ✓ Point of Care
- ✓ Rapid results

✓ Treatment

- ✓ New drugs
- ✓ New uses of existing medications



We Can Help Train Employees

Developed training & materials to assist employers with compliance

- ✓ Materials are available in both English and Spanish

Provide Valley Fever education and training to employees

- ✓ Training video
- ✓ Virtual presentations
- ✓ Live Speaker(as allowed)



Contact Us

Rob Purdie

Patient & Program Development Coordinator

661.489.5244

Rob.Purdie@KernMedical.com

www.ValleyFeverInstitute.com

- ✓ *Participate in Focus Groups*
- ✓ *Receive training for your employees*
- ✓ *Advisory Committee*



Don't Forget

- ✓ Valley Fever is ALWAYS a possible diagnosis
- ✓ If you have had symptoms for 10 days or longer ask about a Valley Fever test*

*Especially if they have had a negative flu and/or COVID-19 test



Questions?

www.ValleyFeverInstitute.com

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A fast-moving dust storm, called a haboob, swept across Bakersfield on Sept. 28, 2019

Courtesy of KABC-TV in Los Angeles

Approved vs Therapeutic

Drugs are frequently used “off label” to treat diseases including Valley Fever

FDA Approved Dosage

Stop if you experience these Side Effects

Therapeutic Dosage

You will experience these side effects & more