

From Dust to Disease...

VALLEY FEVER

Healthcare Provider Symposium

April 29, 2025

KERN PUBLIC
COUNTY HEALTH

VALLEY FEVER

It's in the air. Be Aware.

Disclosure to Attendees

No relevant financial relationships

Paul Rzucidlo, Dr. Johnson, Brynn Carrigan, Dr. Lyon, and Kim Hernandez presenters of this educational activity, have no relevant financial relationship(s) with ineligible companies to disclose.

None of the planners for this educational activity have relevant financial relationship(s) to disclose with ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients

Breaking Down Valley Fever: A look at the Latest Data

Paul Rzucidlo, MPH
Assistant Division Director of Health Services
Kern County Public Health

April 29, 2025

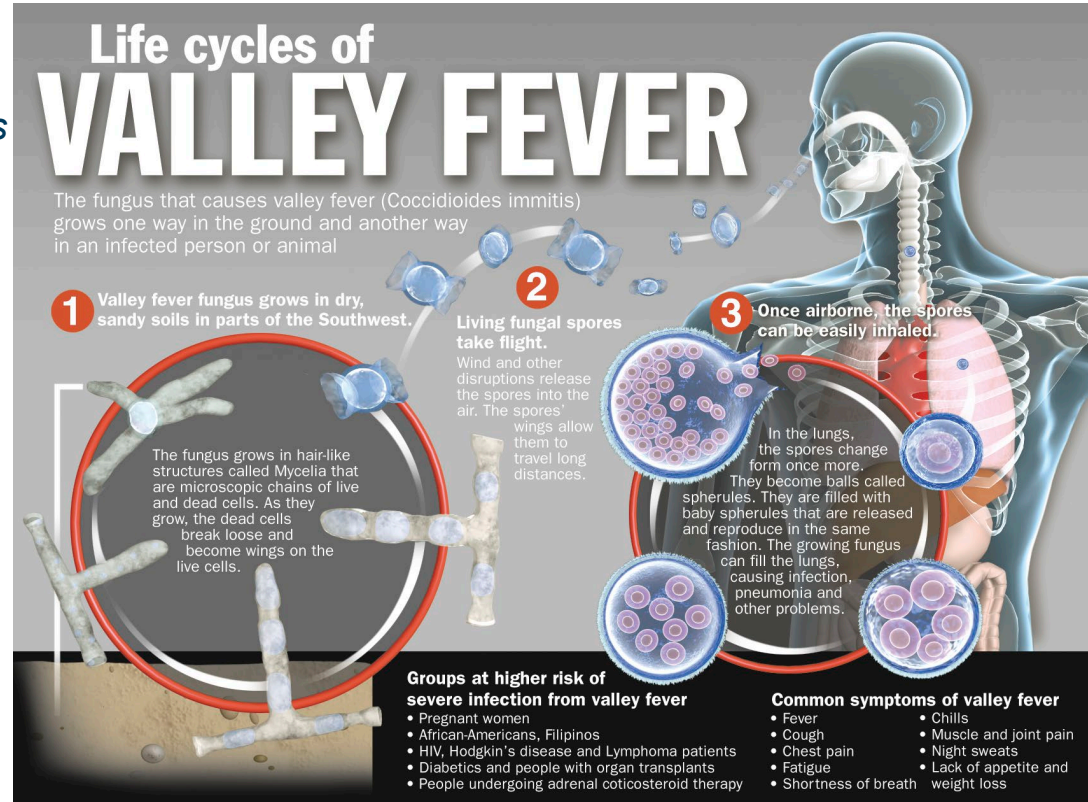


Learning Objectives

- 01 Review the trends in Valley Fever case data from the past year, with a focus on overall incidence and geographic distribution.
- 02 Analyze demographic breakdowns of Valley Fever cases, including age, gender, and geographic factors, to identify vulnerable populations.
- 03 Examine key factors contributing to the increase in Valley Fever cases.

Valley Fever in Kern County

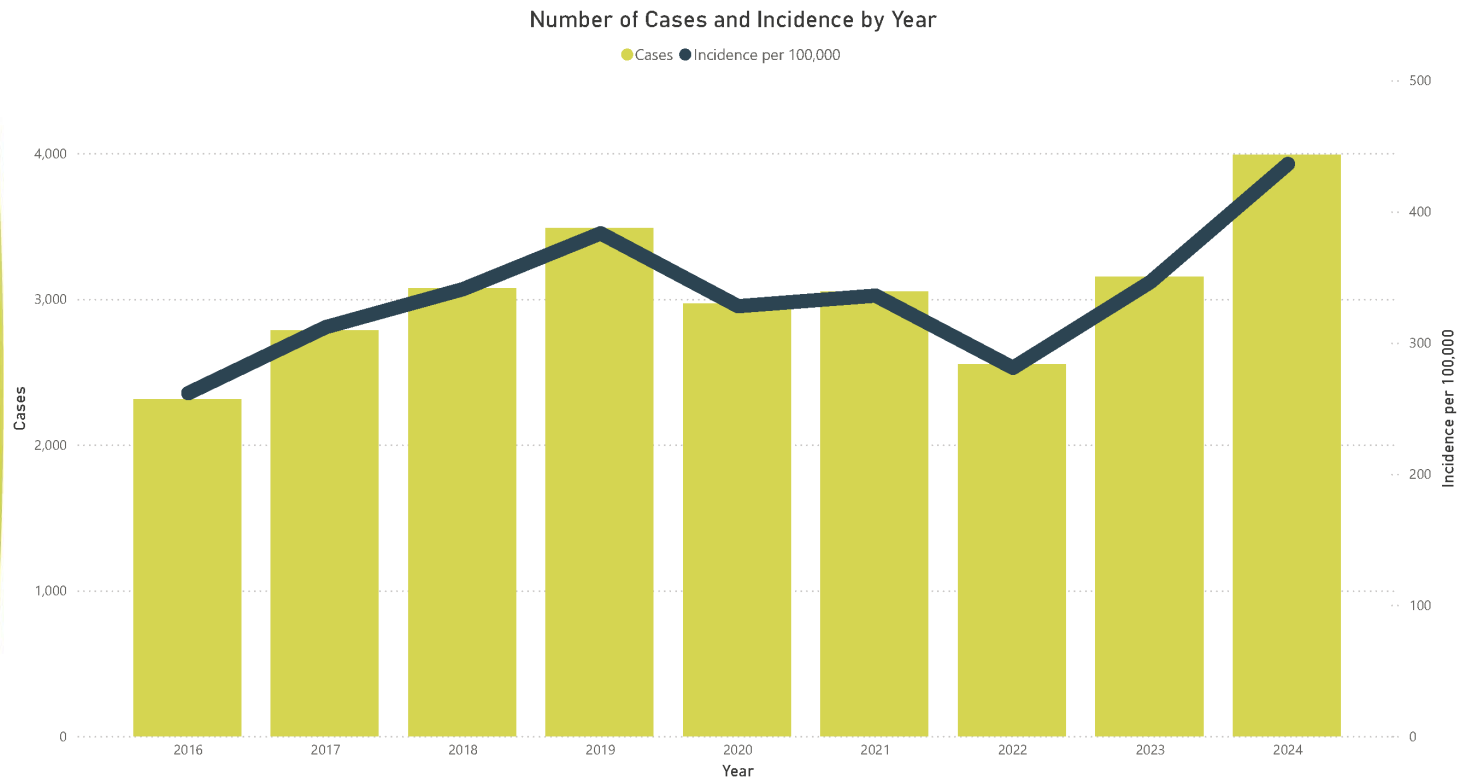
- An illness caused by fungi in the genus *Coccidioides*
- The fungus grows in the soil in some areas of the southwestern United States
- Has been spreading as climate changes
- About 60% of infections are asymptomatic, but can lead to severe illness
- Not transmissible between people



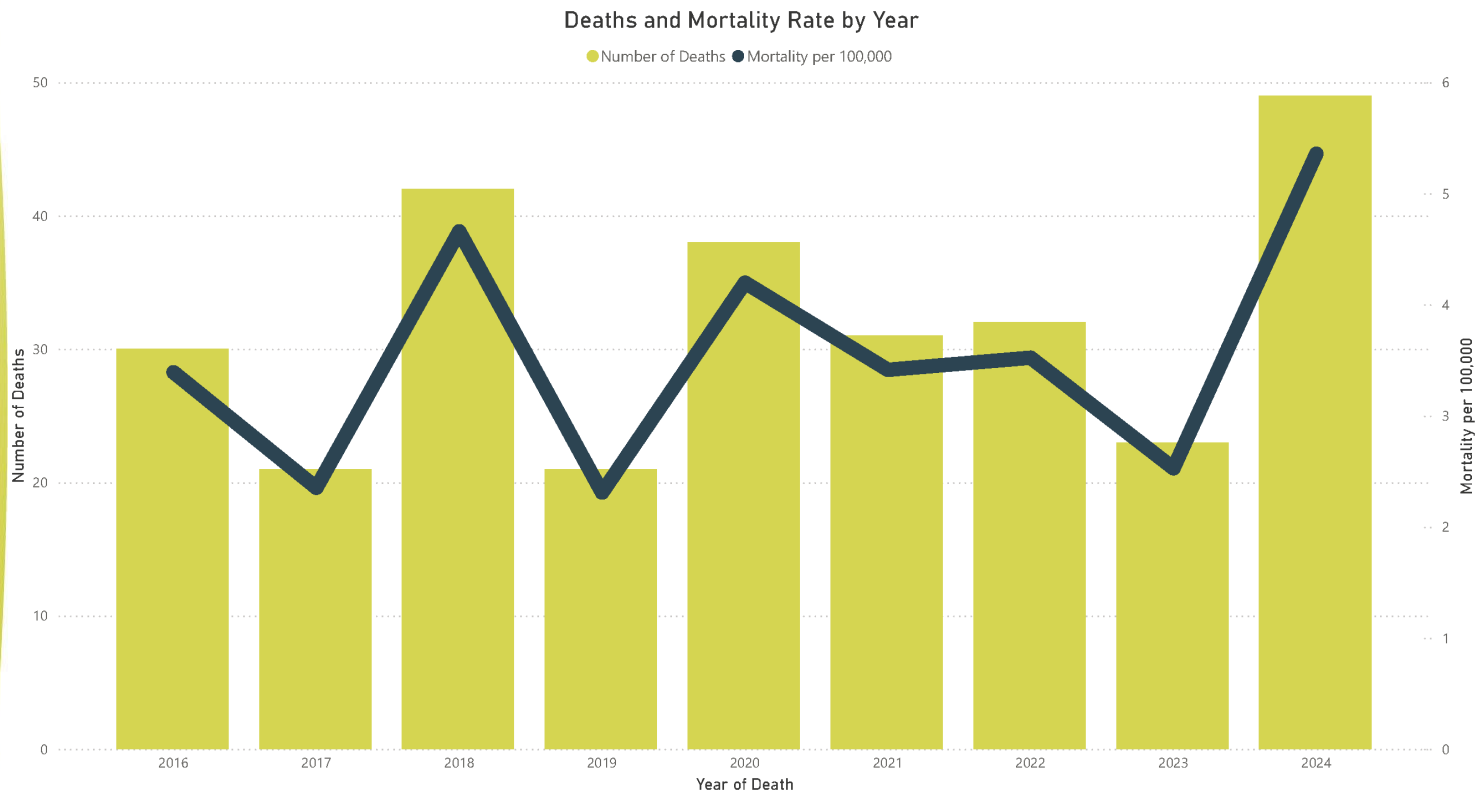
Sources: Valley Fever Center for Excellence, Californian research

MICHAEL BORJON/THE CALIFORNIAN

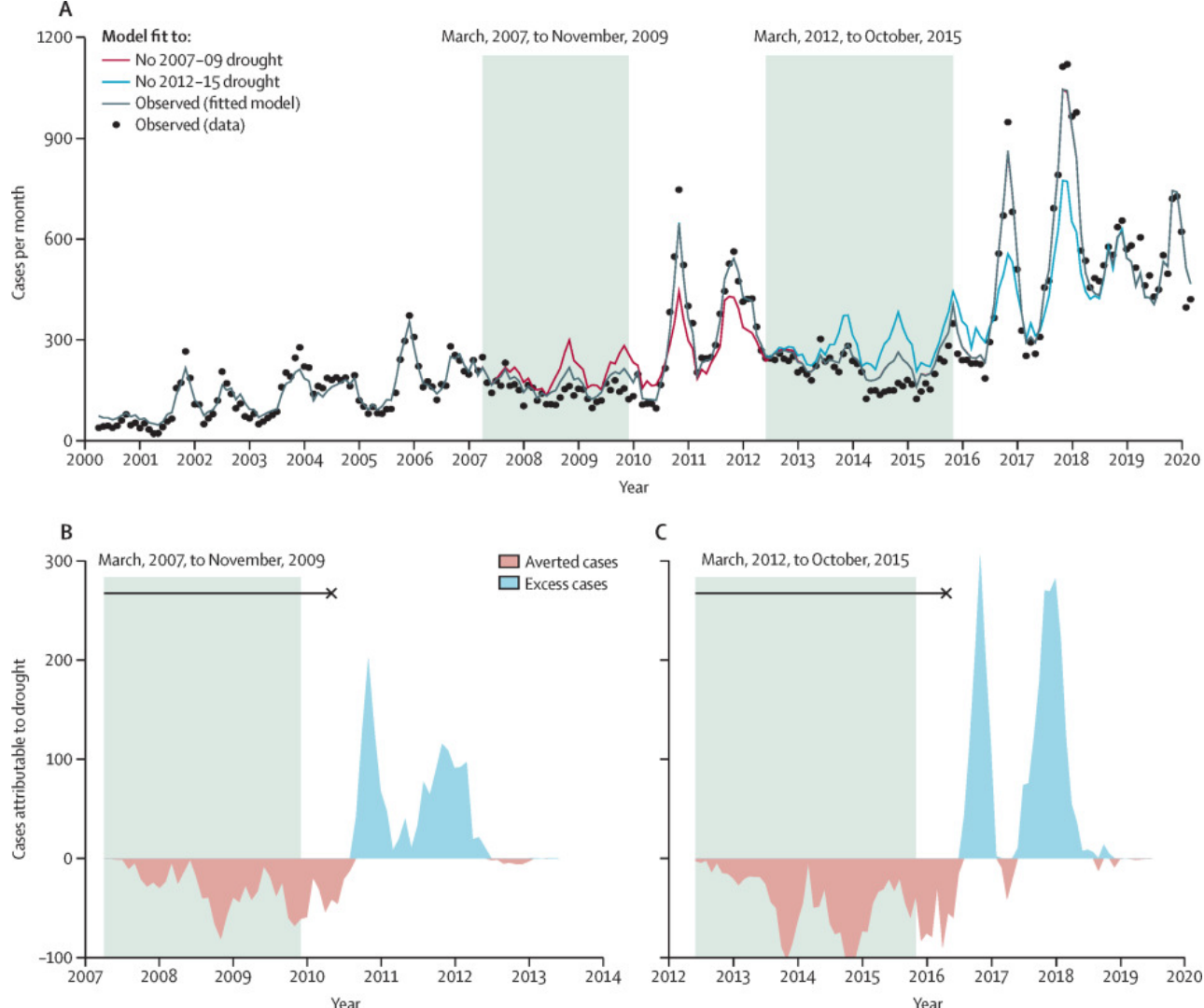
- 3,990 cases in 2024
- 436.3 cases per 100,000
- Highest year on record
- 14% increase from 2019, the previous highest year on record
- 27% increase over 2023.



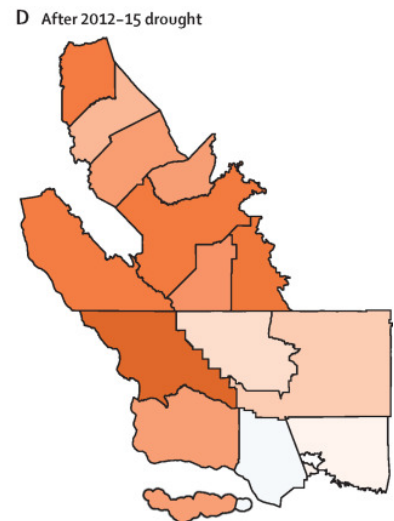
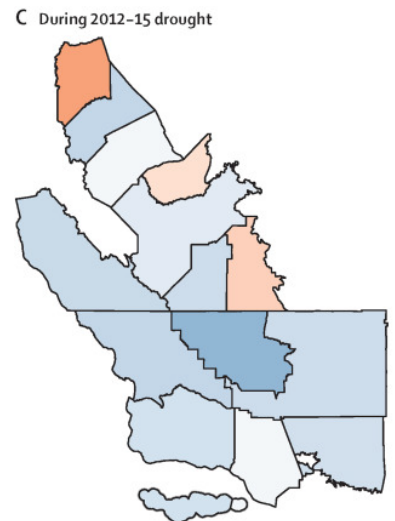
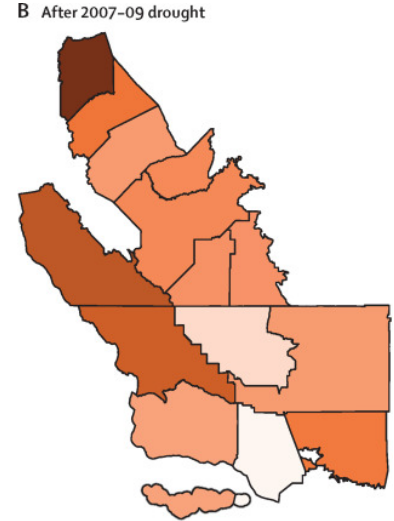
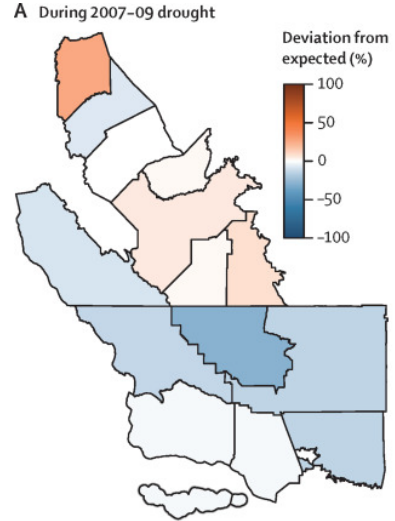
- 49 Valley Fever associated deaths in 2024
- 5.4 deaths per 100,000
- Highest year on record
- 17% increase from 2018, the previous highest year on record
- Greater than 2x increase over 2023.



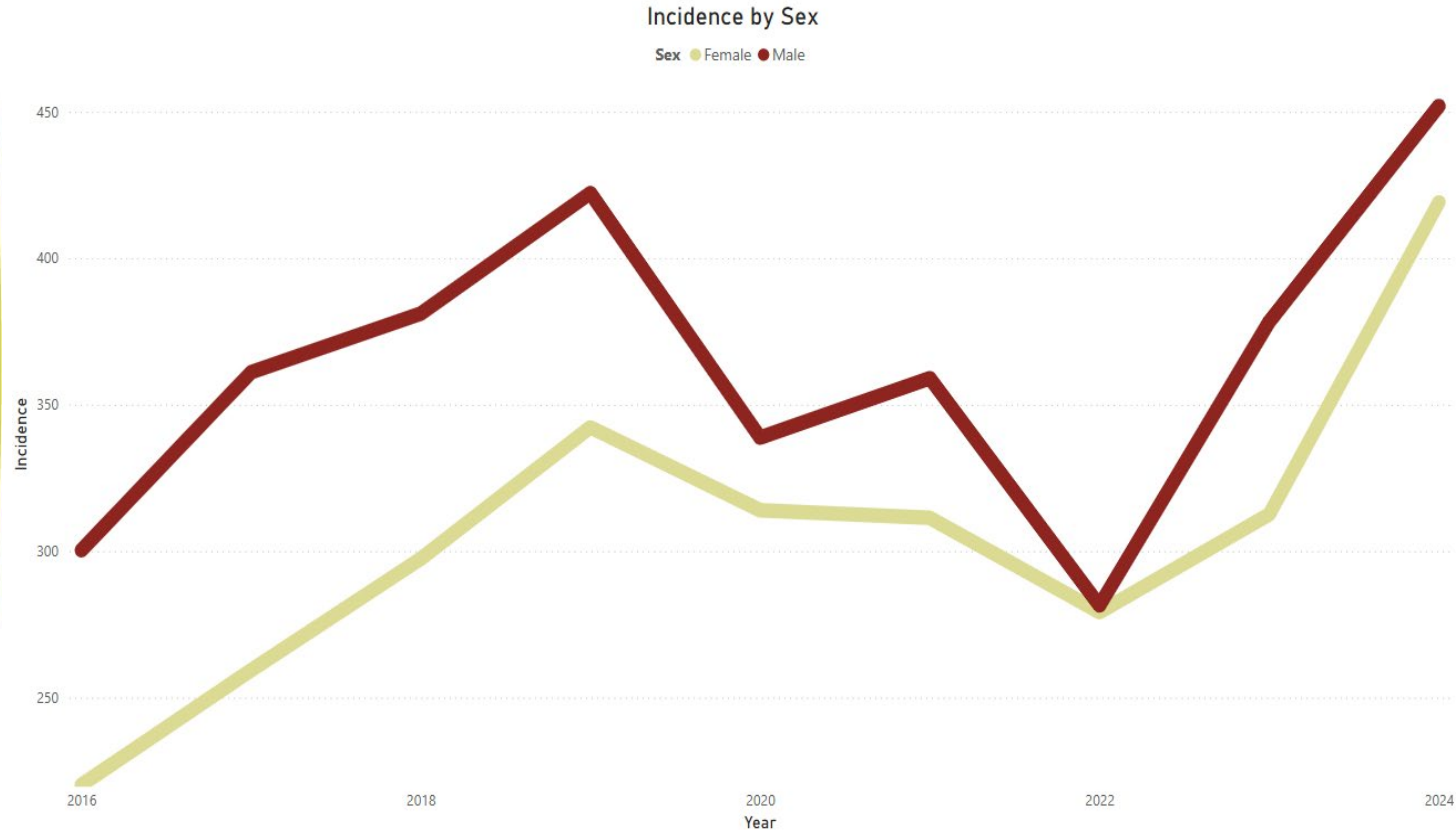
- Increase of cases may be explained by cycle of drought and wet weather.
- Recent modeling has shown that during a drought cases go down, then after the drought breaks cases rise for the two years following.



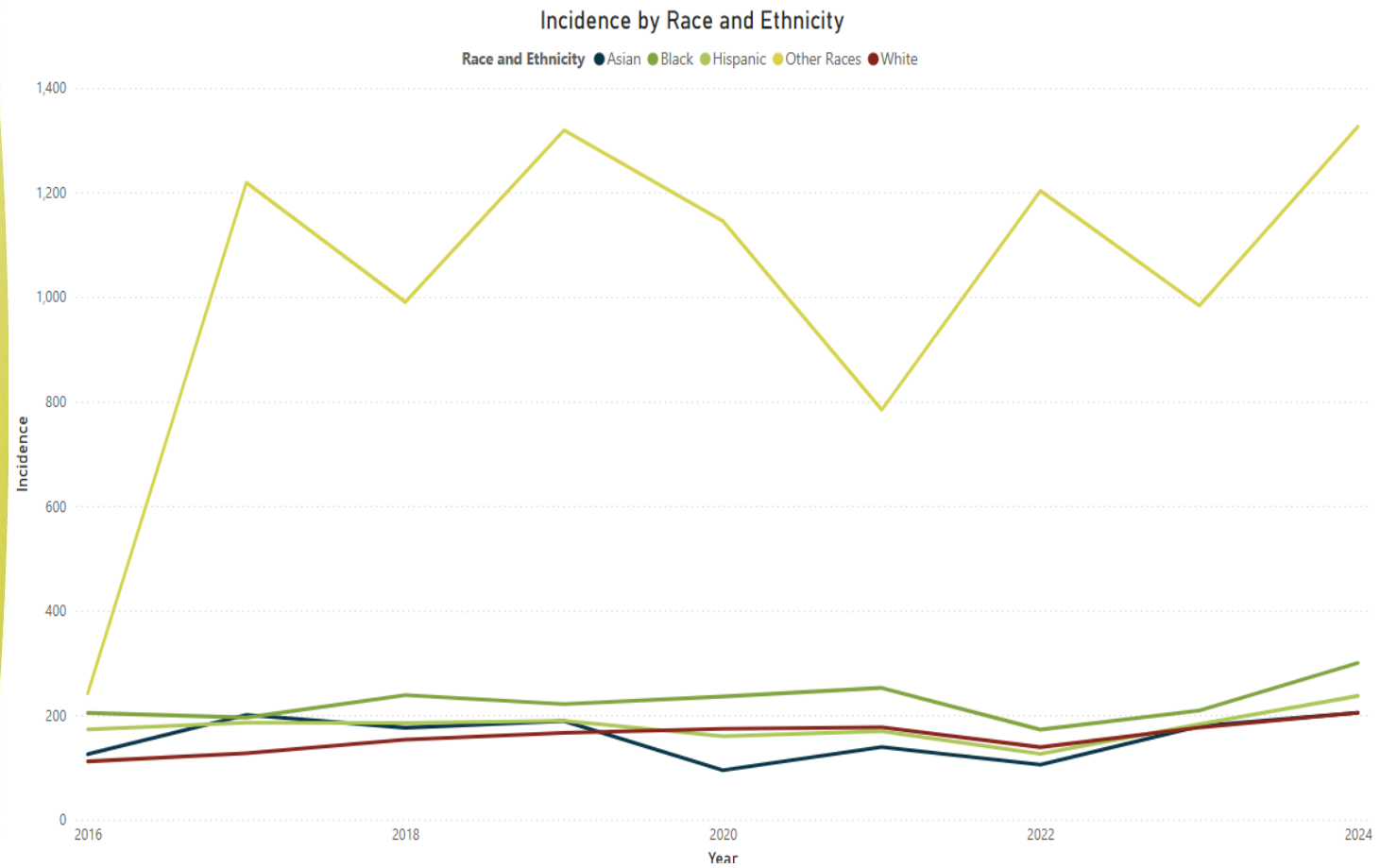
- Drought started in 2020
- Heavy rains in 2022
- Increasing cases 2023 and 2024
- Similar to pattern observed in the modeling.



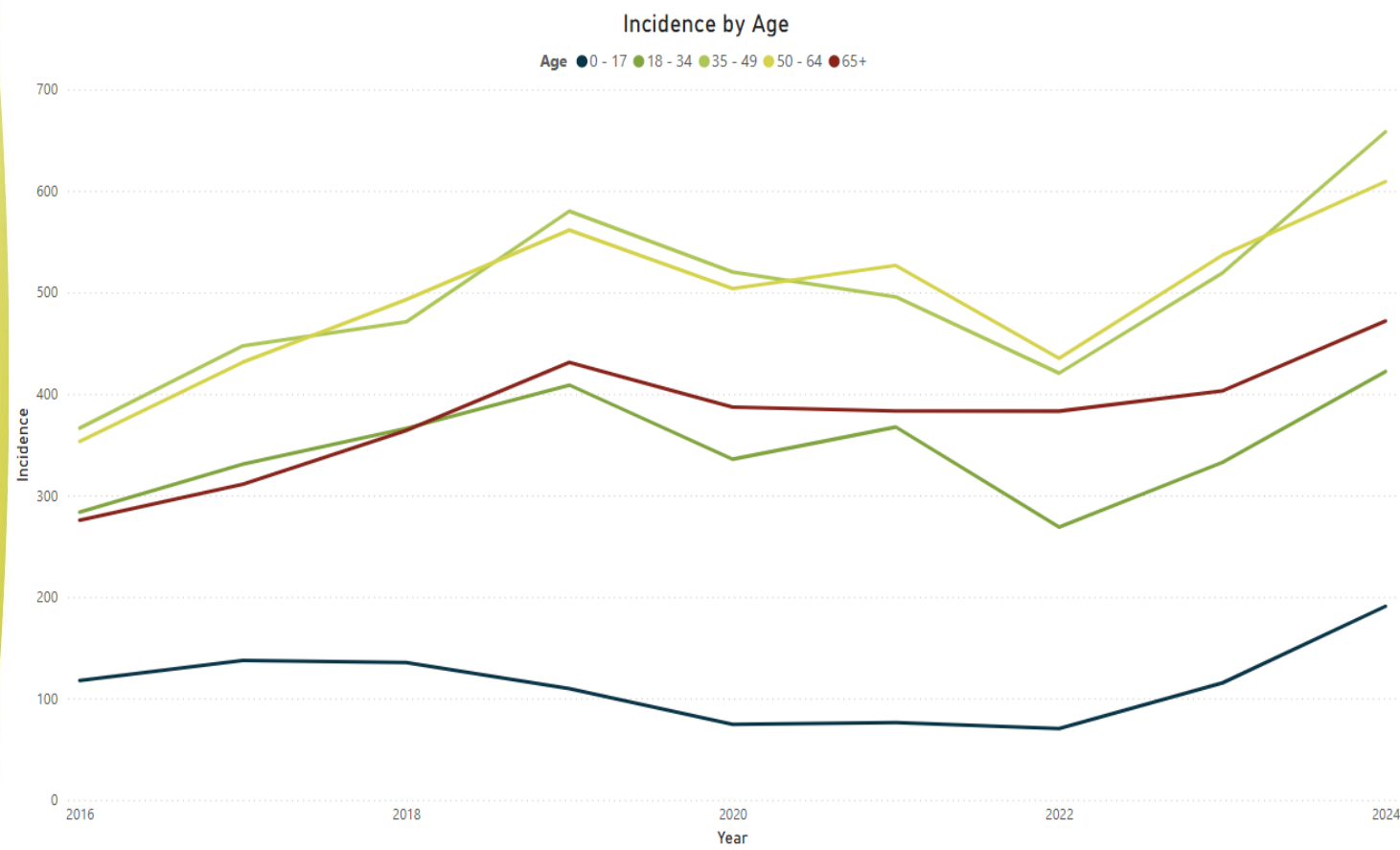
- Males 452.0 cases per 100,000
- Females 419.1 cases per 100,000
- Males rate is an increase of 19.5% from 2023
- Female rate is an increase of 34.1% from 2023.



- Other Races
1,325.9 cases per 100,000
- African Americans
299.5 cases per 100,000
- Other races consistently most affected but due to small population can fluctuate from year to year.
- African American rate had highest increase of 43.6% from 2023.



- 35-49 highest rate with 658.3 per 100,000
- Pediatric cases have the largest increase with a 65.4% increase over 2023.
- Next highest increase is 18-34 with 27.0%





Valley Fever
Institute
at Kern Medical

Coccidioidomycosis: The Plague Of The Lower Sonoran Life Zone

Royce H. Johnson, MD, FACP
Medical Director, Valley Fever Institute
Chief, Infectious Disease, Kern Medical
Professor of Medicine, David Geffen School of Medicine at UCLA

April 29, 2025

Learning Objectives

Identify the symptoms & clinical manifestations of Coccidioidomycosis

Provide the medical workup for diagnosis & treatment using appropriate antifungal agents



Coccidioidomycosis



Domingo Ezcurra

Coccidioidomycosis



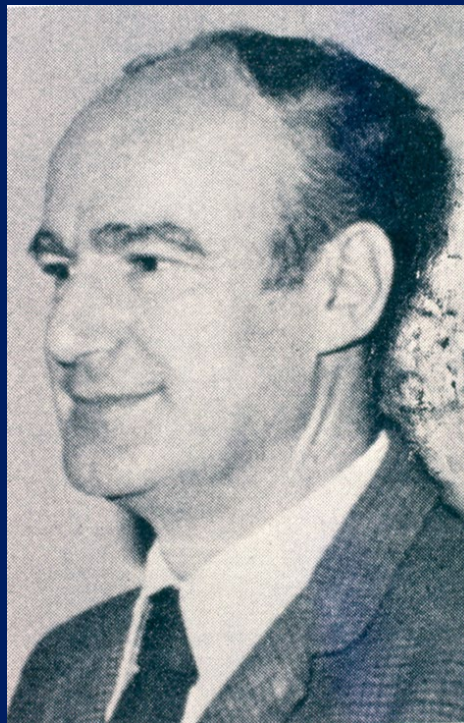
Joas Furtado Silveira

Research Pioneer



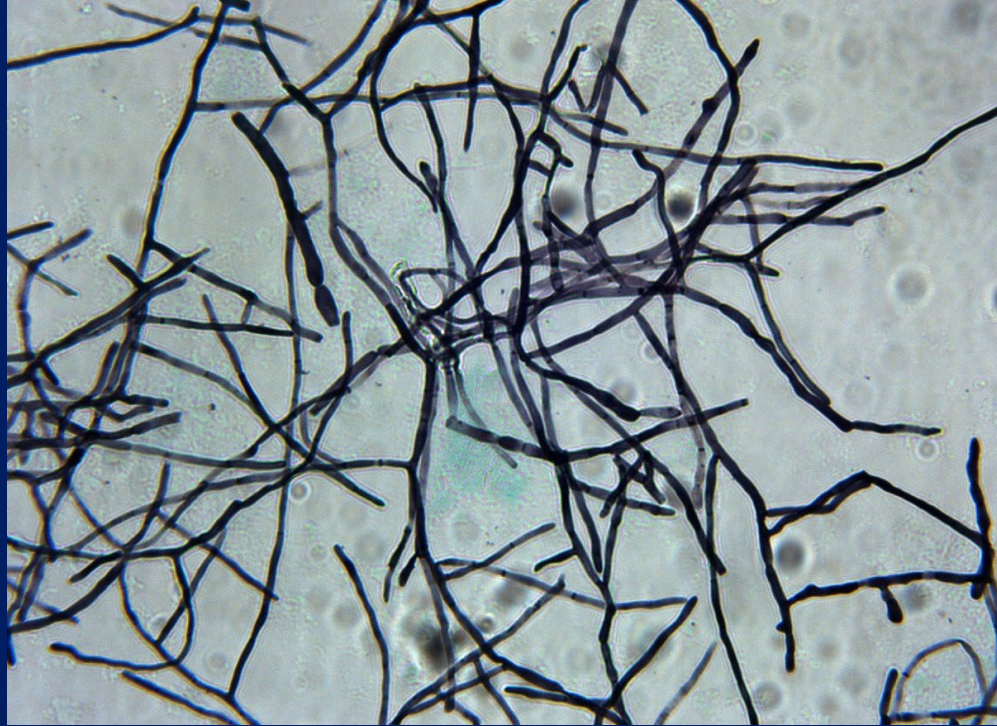
Myrne A. Gifford, MD

Treatment Pioneer



Hans Einstein, MD

Coccidioides



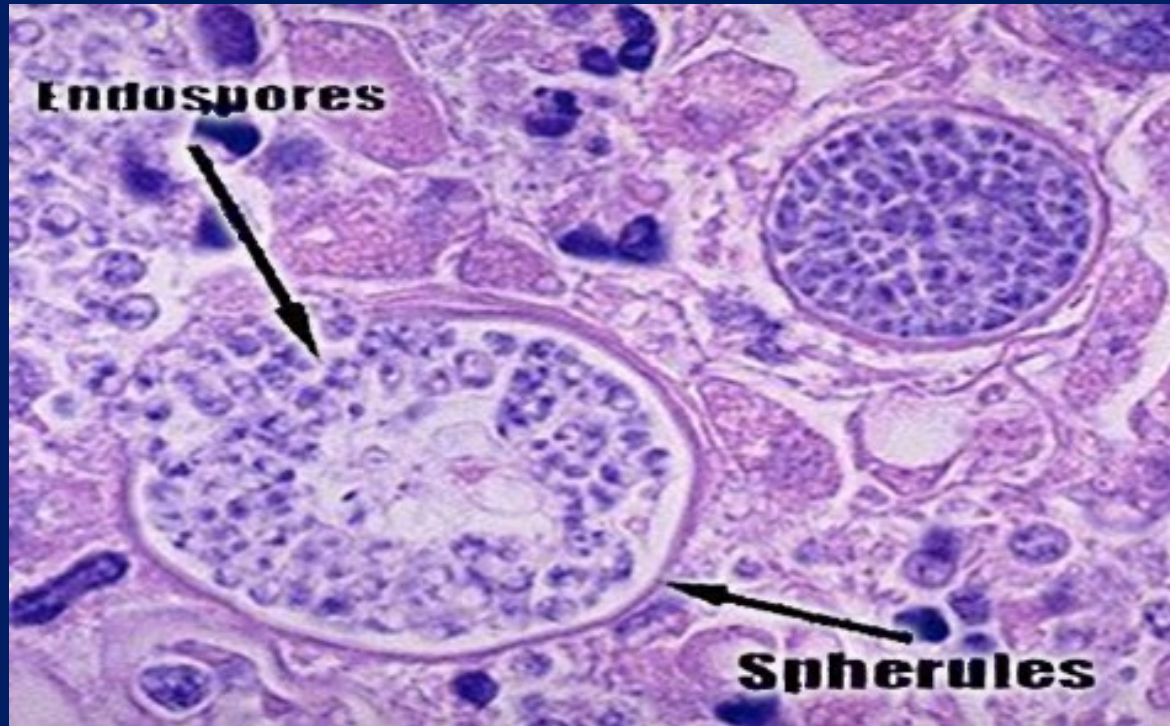
Mycelia

Coccidioides

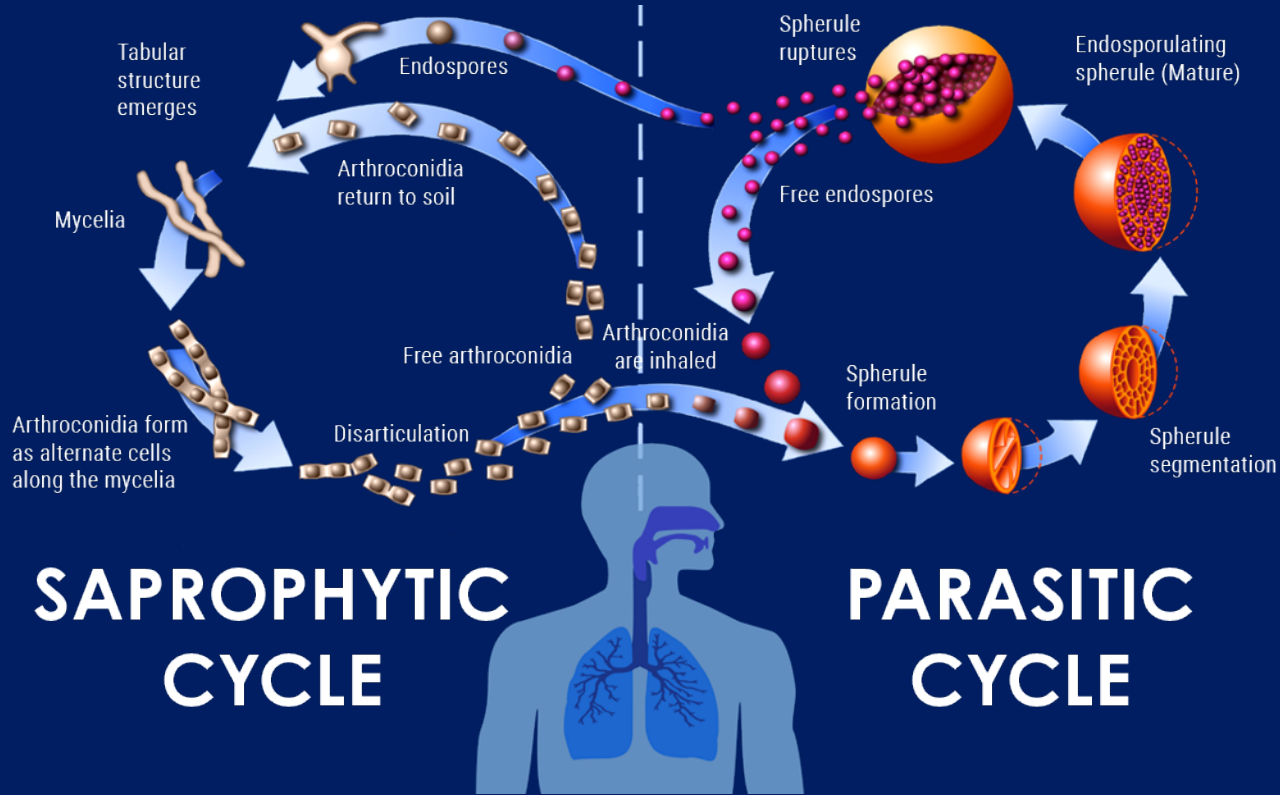


Arthroconidia

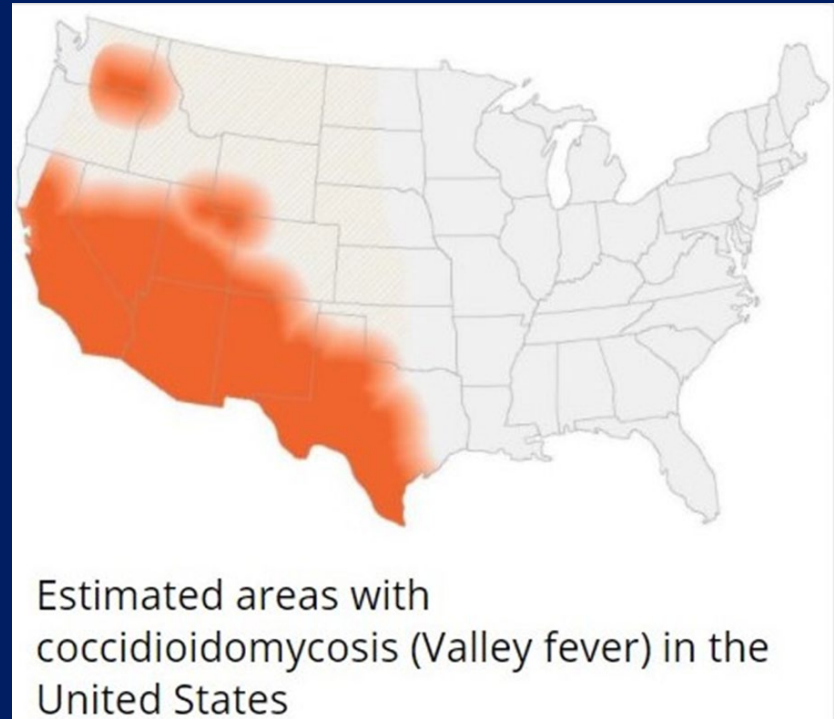
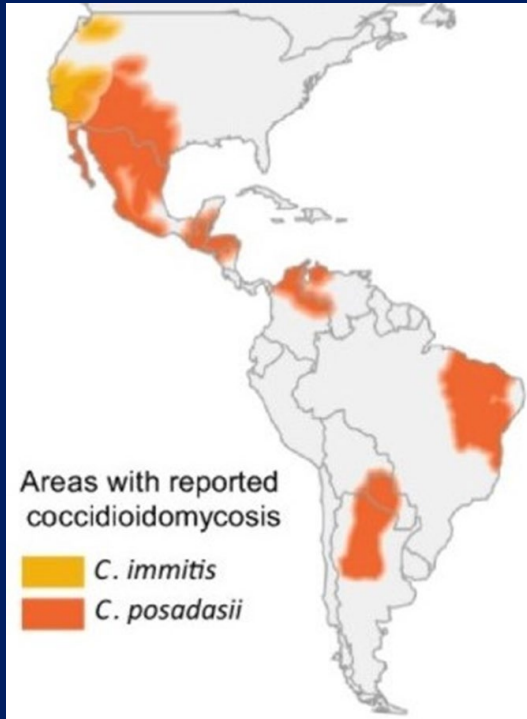
Coccidioidomycosis



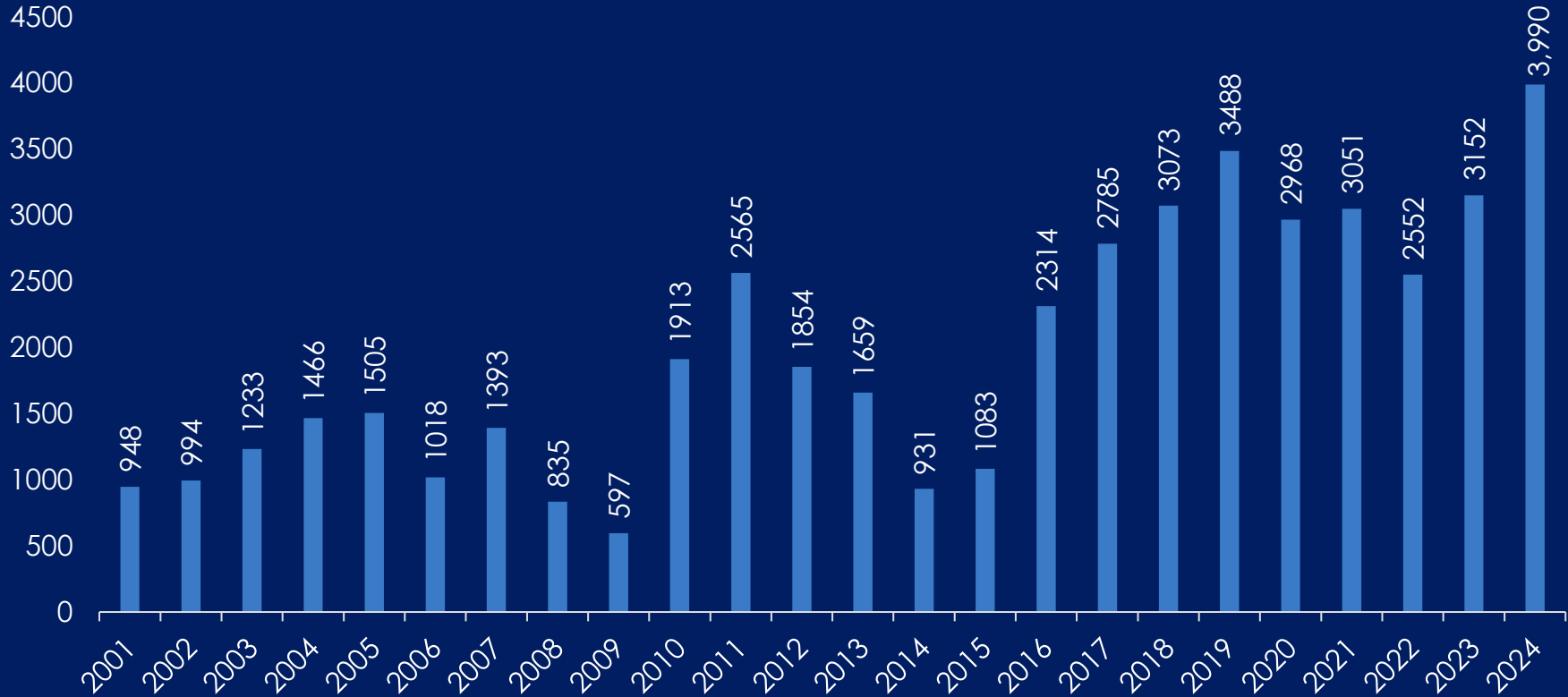
Morphology of Coccidioides



Endemic Areas



Reported Cases in Kern County



Basis for Establishing a Diagnosis of Cocci

Skin Test

Serologic Test

EIA, immunodiffusion, complement fixation, etc.

Wet Mount

Sputum, pus or body fluids

Histologic studies of biopsy

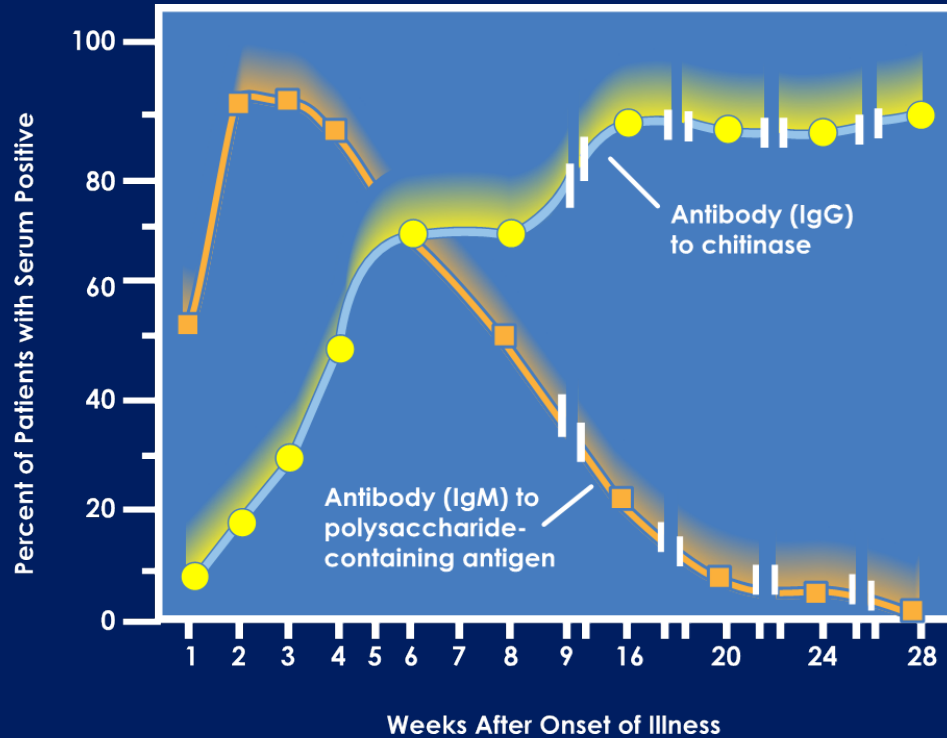
Skin, lung, etc.

Cultures

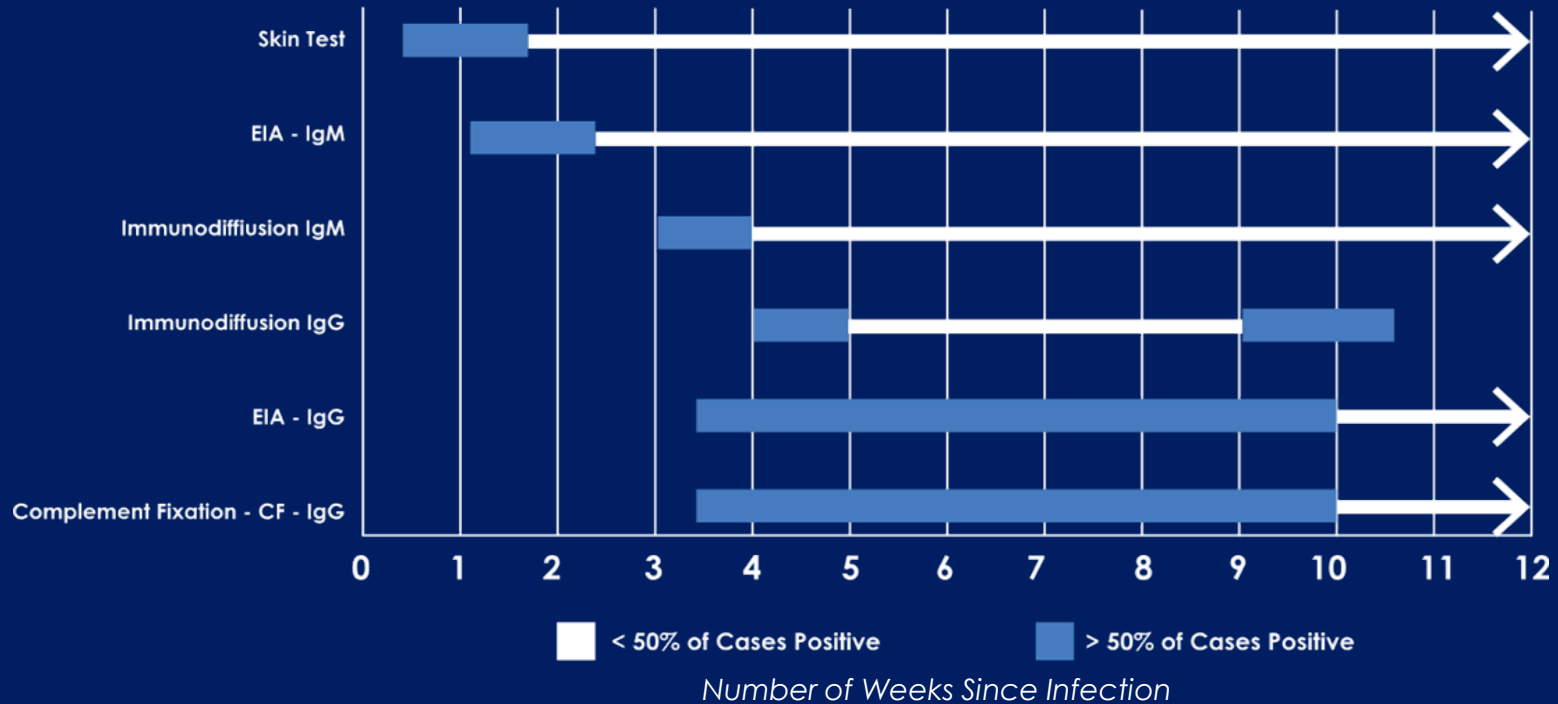
Sputum, pus or body fluids



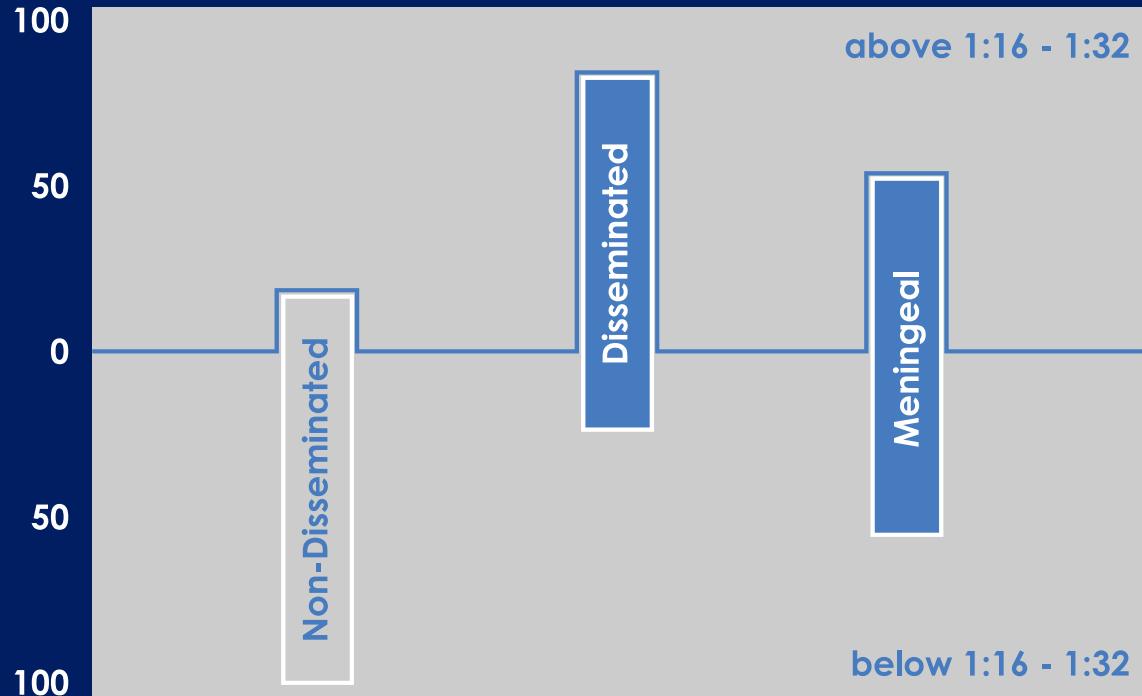
Coccidioidomycosis



Course of Serum Reactivity to Serological Methods



CF Titer in Primary & Disseminated Cocci



Pulmonary Coccidioidomycosis

✓ Asymptomatic Primary Pulmonary

✓ Symptomatic Primary Pulmonary

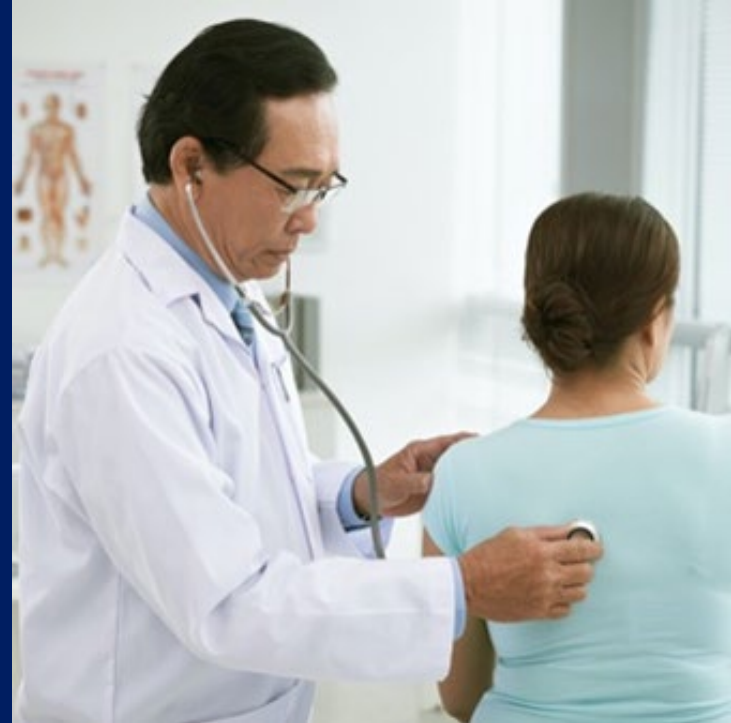
- ✓ Influenza-like Illness
- ✓ Pneumonia
- ✓ Pleural

✓ Primary Cutaneous



Complicated & Residual Pulmonary Cocci

- ✓ Severe & Persistent Pneumonia
- ✓ Progressive Primary
- ✓ Progressive Fibrocavitary
- ✓ Cavities
- ✓ Nodules
- ✓ Fibrosis
- ✓ Empyema



Disseminated Coccidioidomycosis

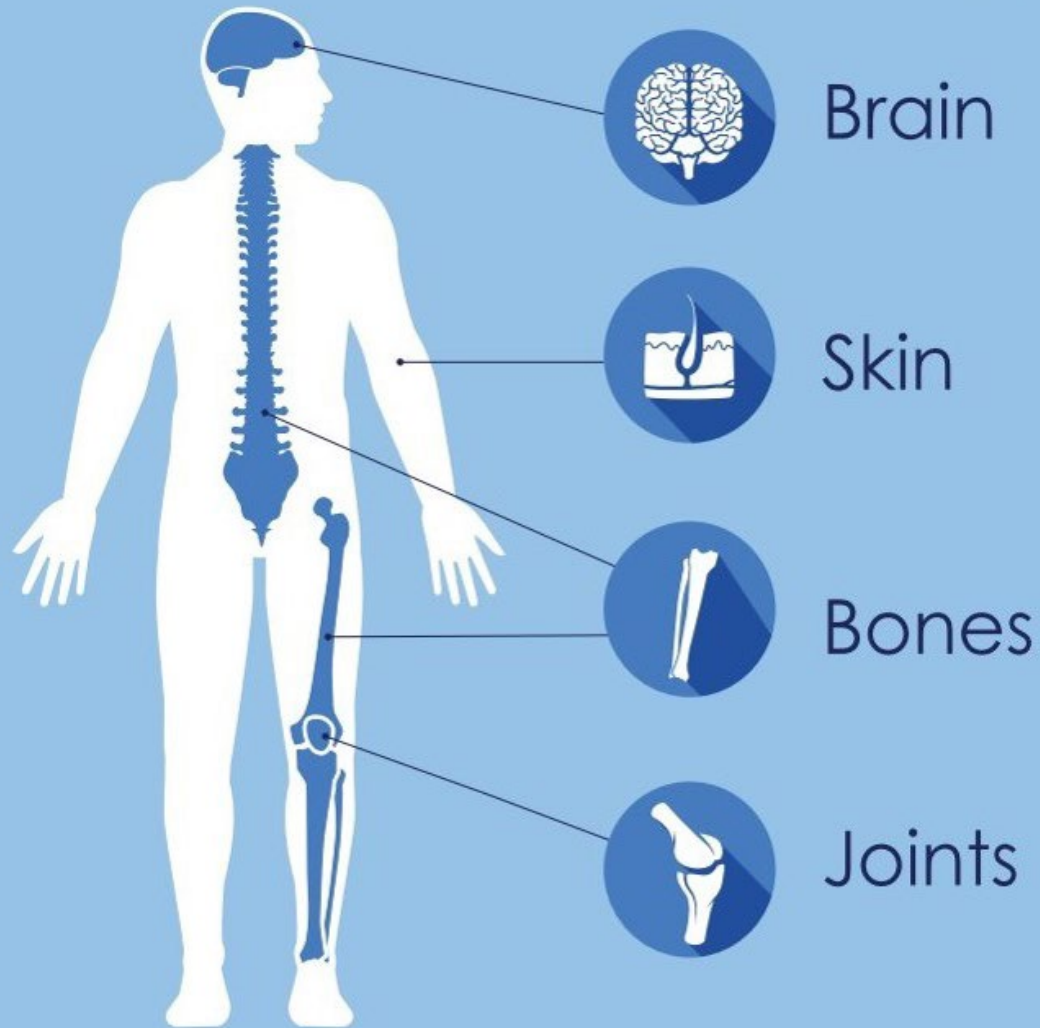
Signs & symptoms vary by location
Common sites include:

Brain

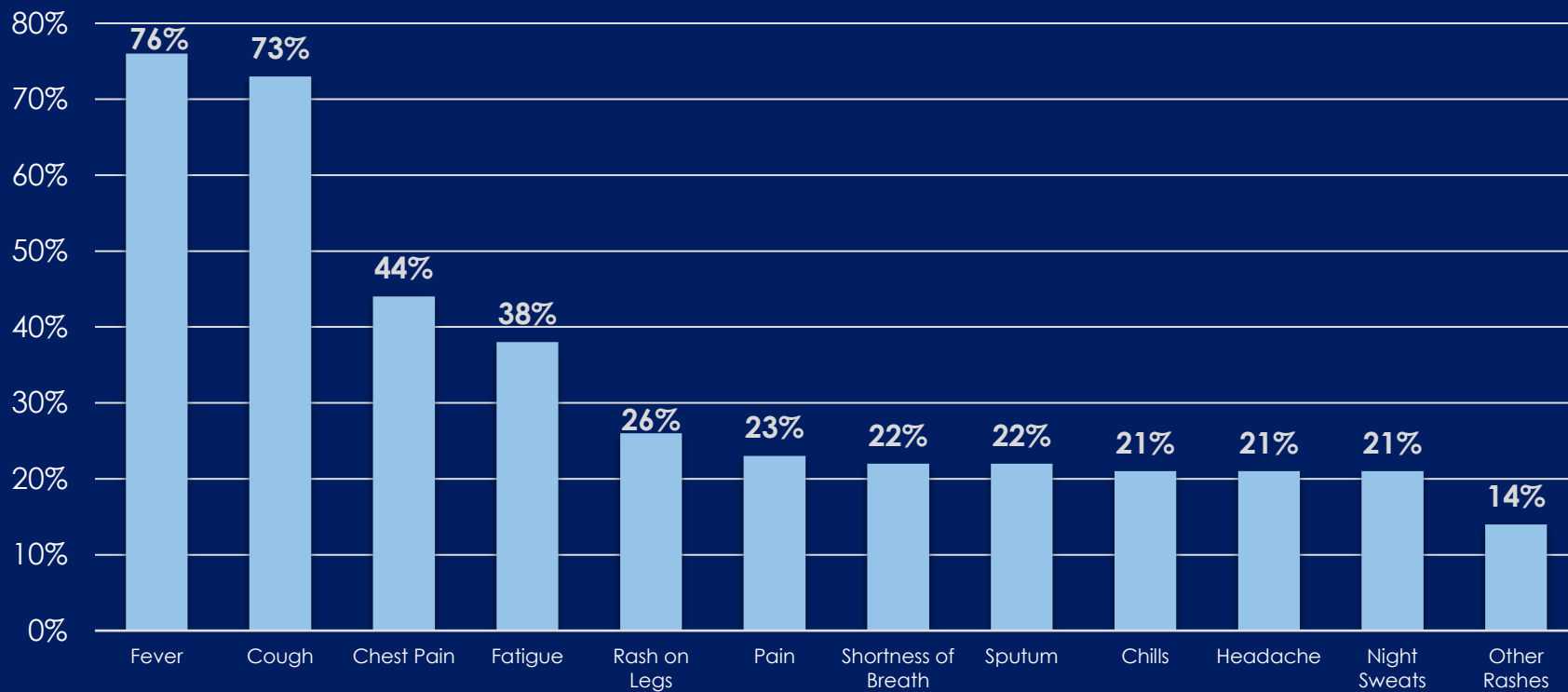
Skin

Bones

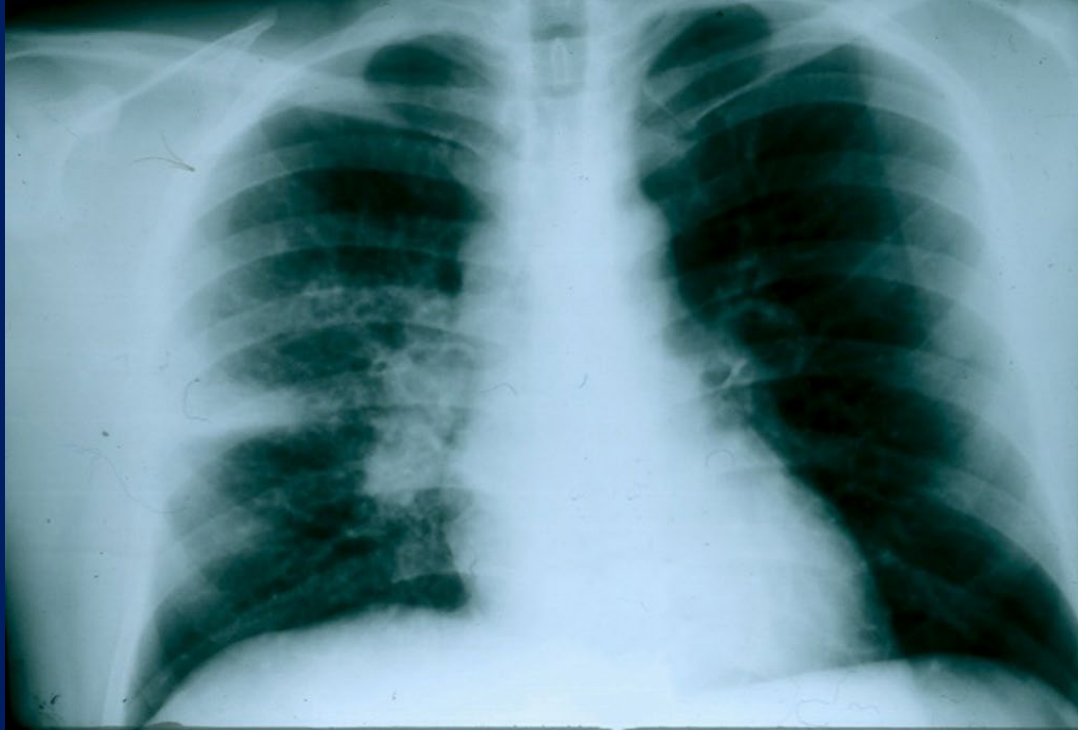
Joints



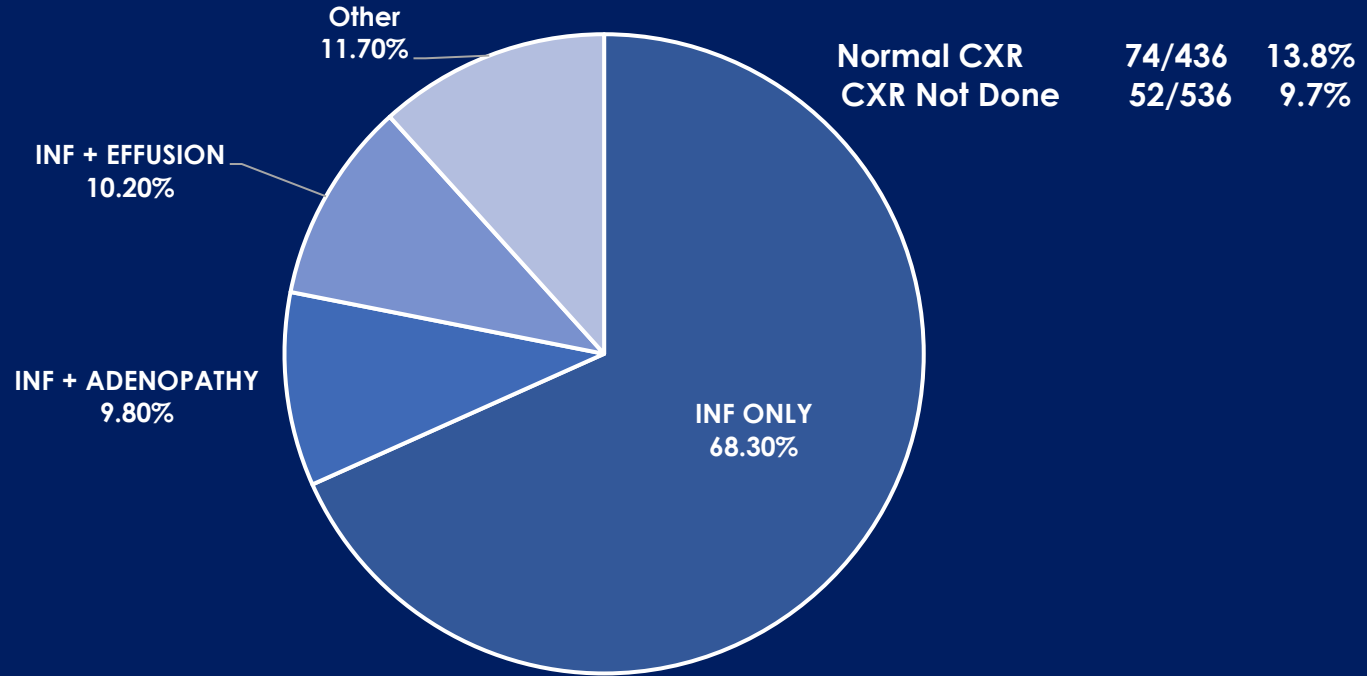
Symptom Prevalence



Right Mid-lung Field Hilar Adenopathy



Radiographic Abnormalities



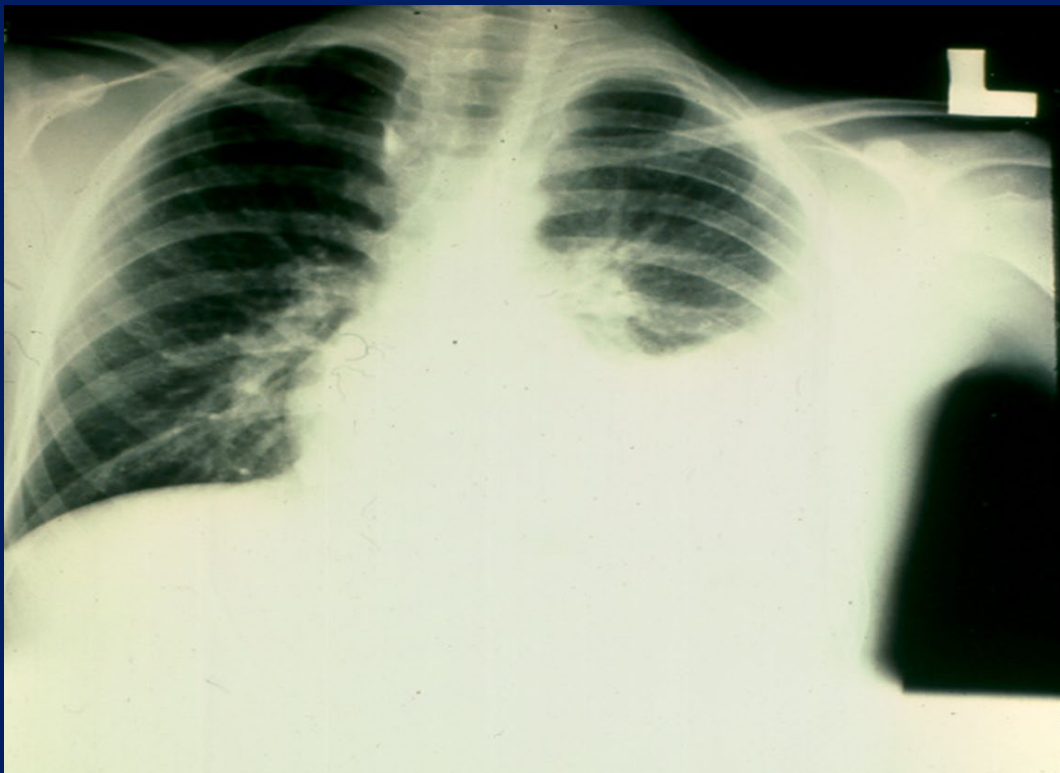
Erythema Nodosum



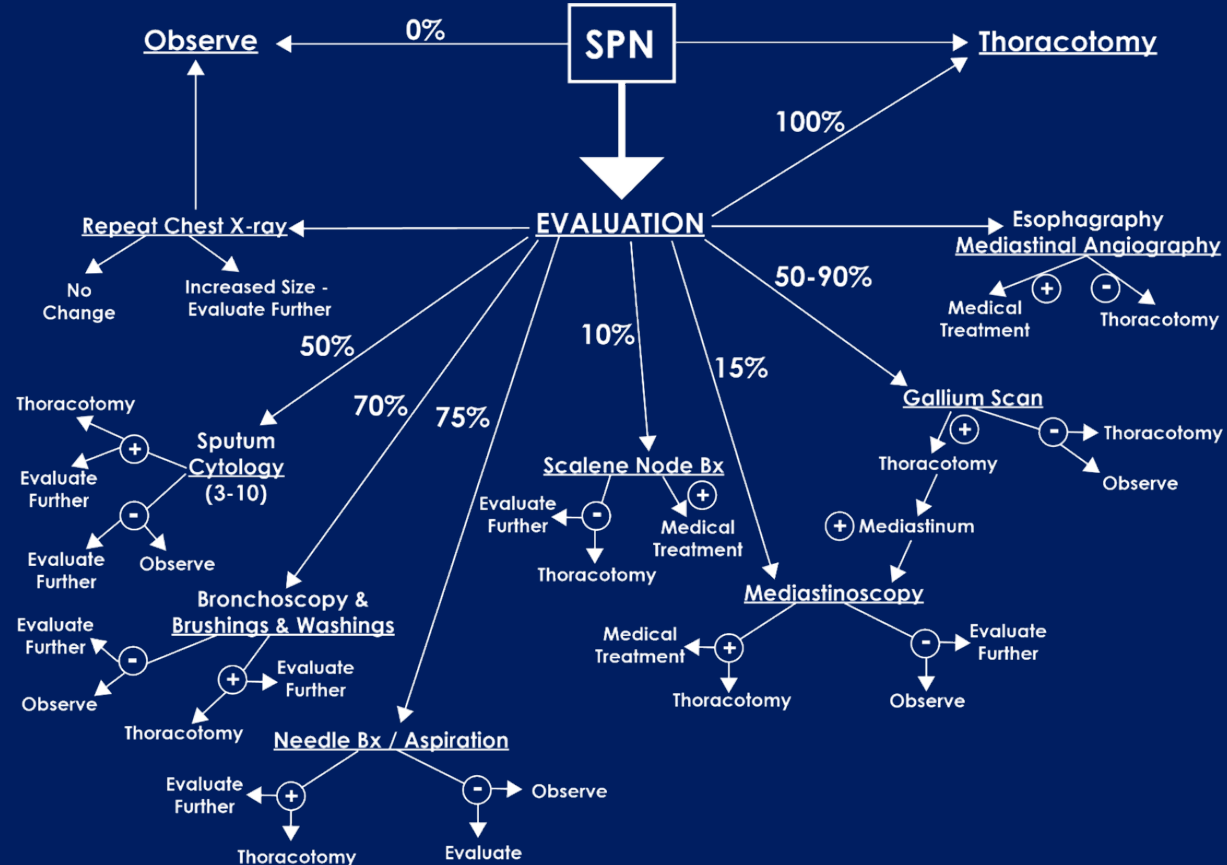
Erythema Multiforme



Pleural Effusion



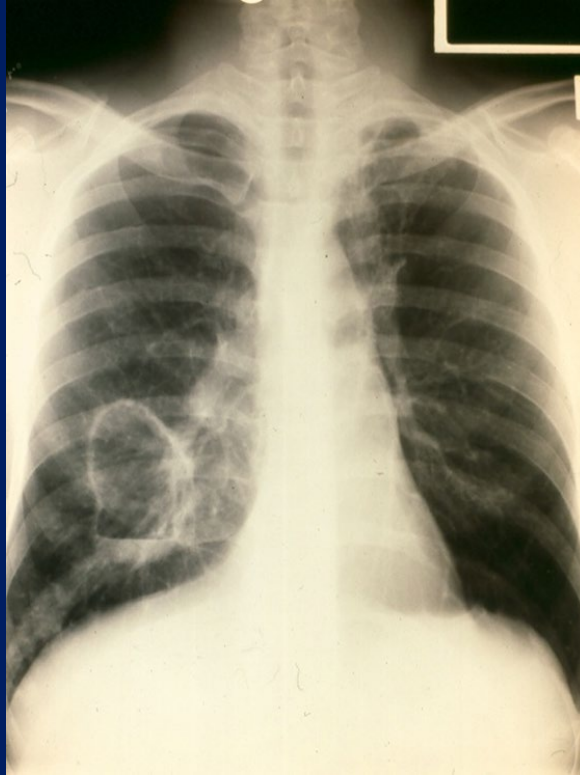
Solitary Pulmonary Nodule



Bronchial Mass



Giant Cavity



Fibrocavitary Disease



Severe Pulmonary Disease

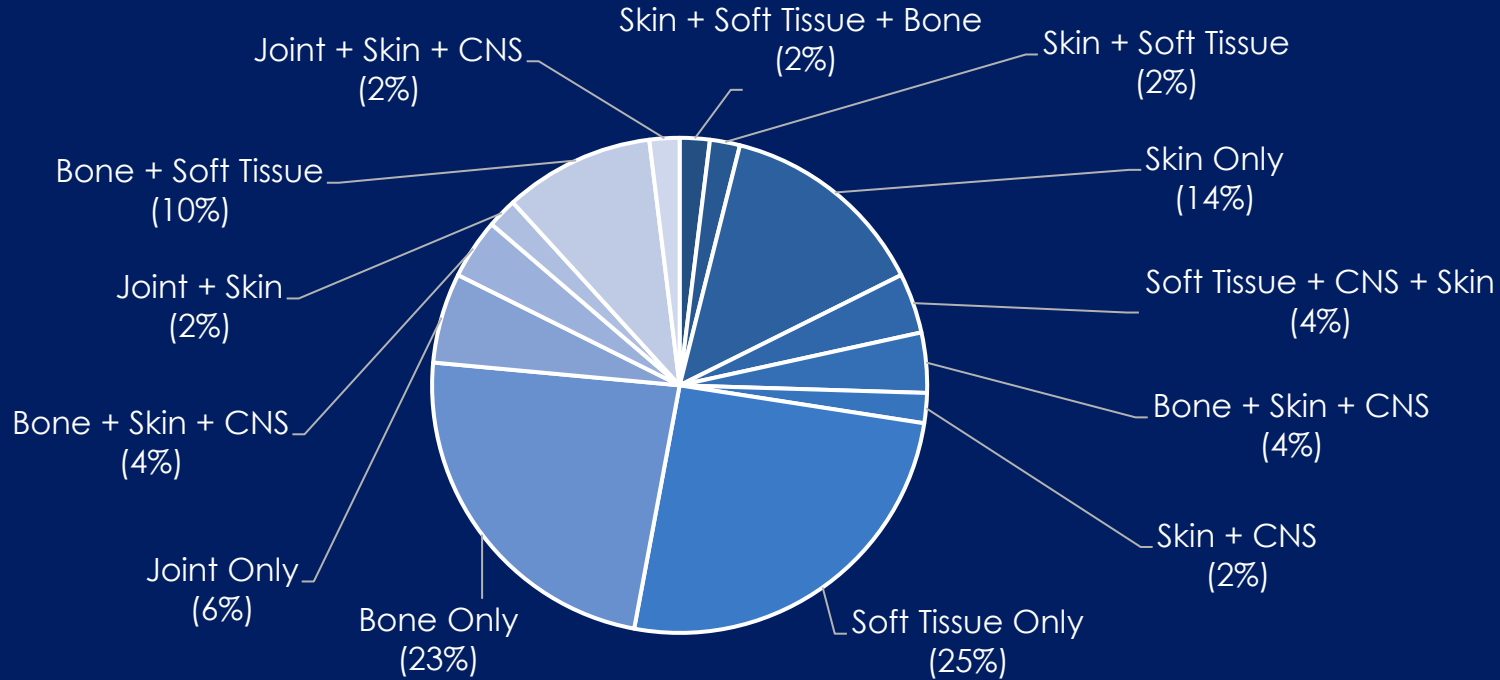


Clinical Features & Factors Associated with Dissemination

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.

Sites of Dissemination



Cutaneous Coccidioidomycosis



Cutaneous Granuloma



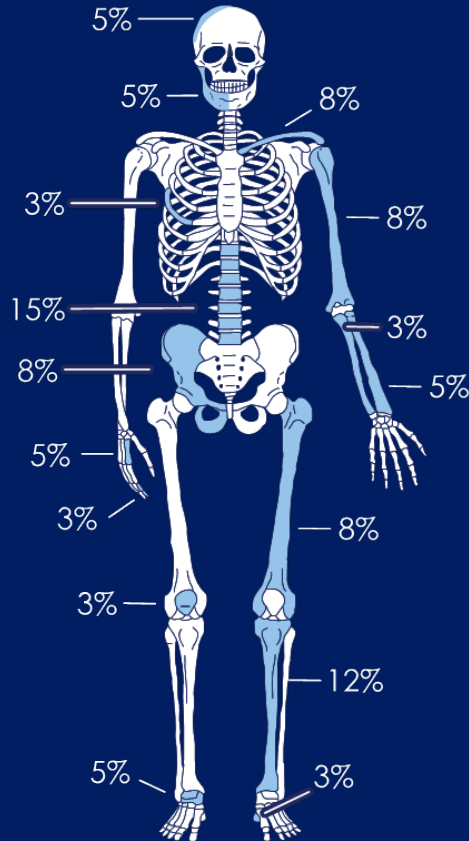
“Zostiform” Dissemination



Cutaneous Coccidioidomycosis



Distribution of Bone Lesions



Osteomyelitis of Right 4th Digit



Osteomyelitis

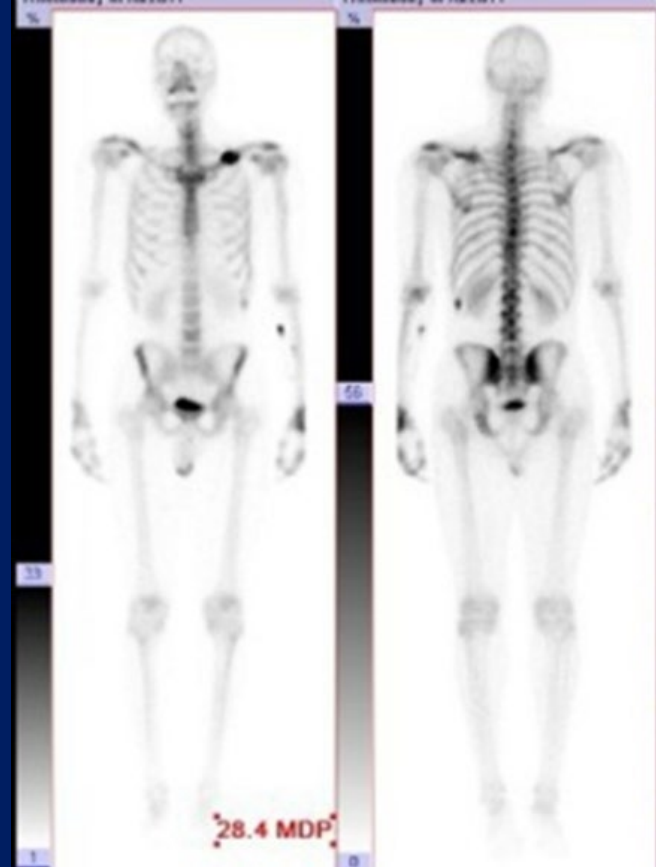


Osteomyelitis

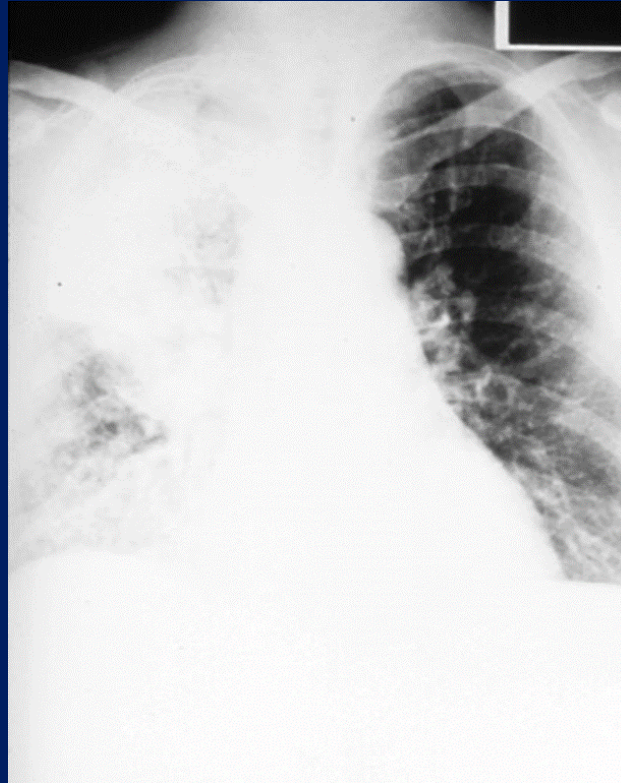


Bone Scan

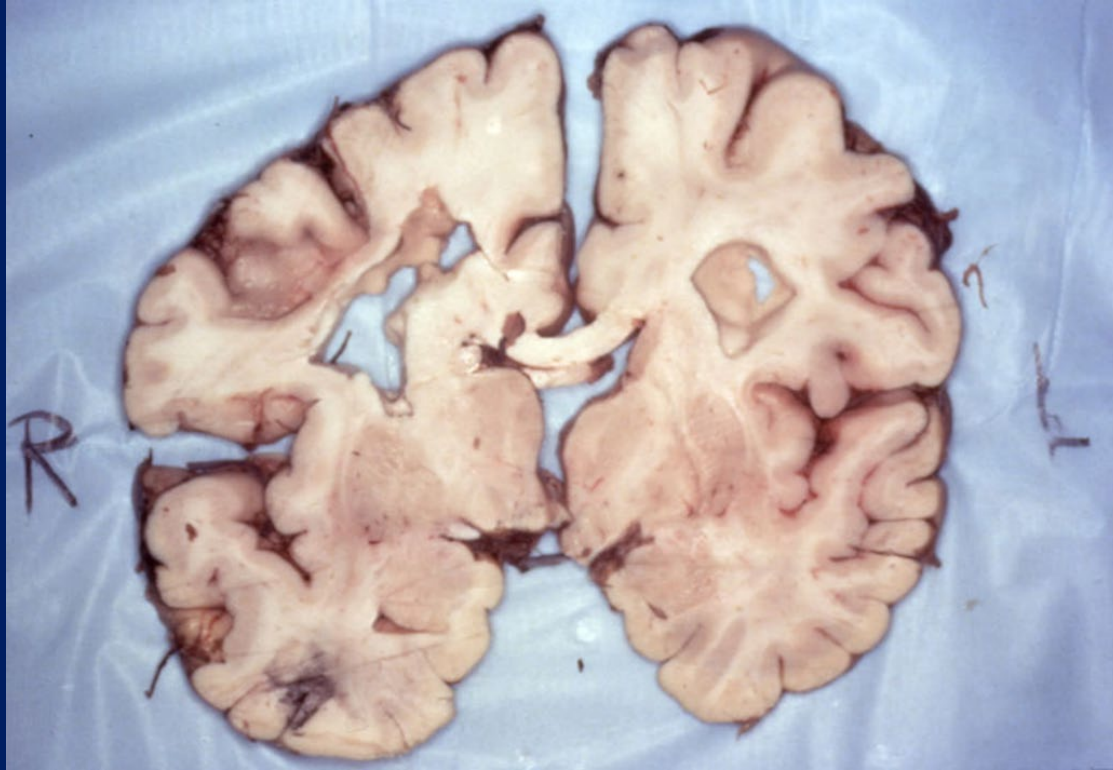
Bone scan demonstrating areas of focally increased uptake in left mid-clavicle, mid-thoracic spine and lateral aspect of left 11th rib



Severe Pneumonia with Headache



Cocci Meningitis



Characteristics of the Ideal Antifungal Drug

Broad spectrum of antifungal activity

Available for oral & intravenous administration

Fungicidal

Penetrates body fluid spaces, especially the spinal fluid

No development of resistance during treatment

No toxicity

Therapeutic Agents



Polyenes

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



Azoles

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



New Antifungal Drugs

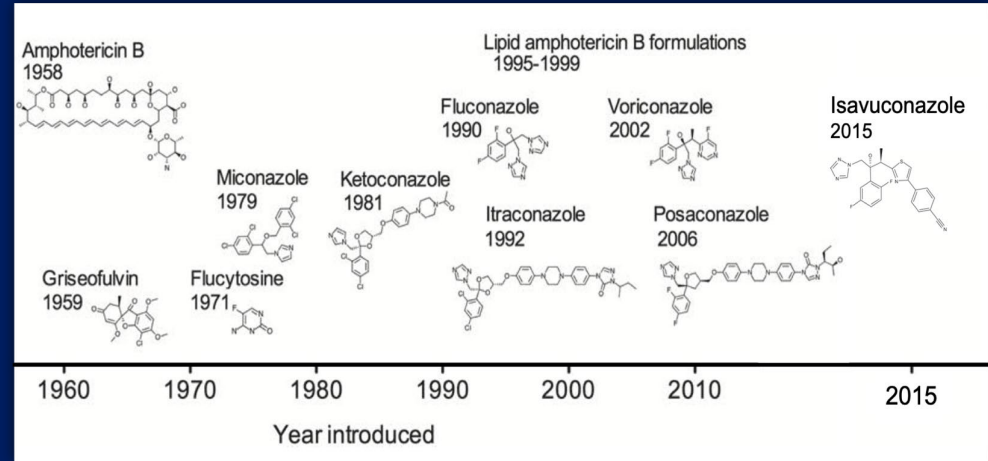
- ✓ Nikkomycin Z
- ✓ Olorofim
- ✓ Ibrexafungerp
- ✓ VT-1161



Immunomodulators

- ✓ Interferon γ : ?

Butte M, Disseminated Coccidioidomycosis Treated with Interferon- γ & Dupilumab

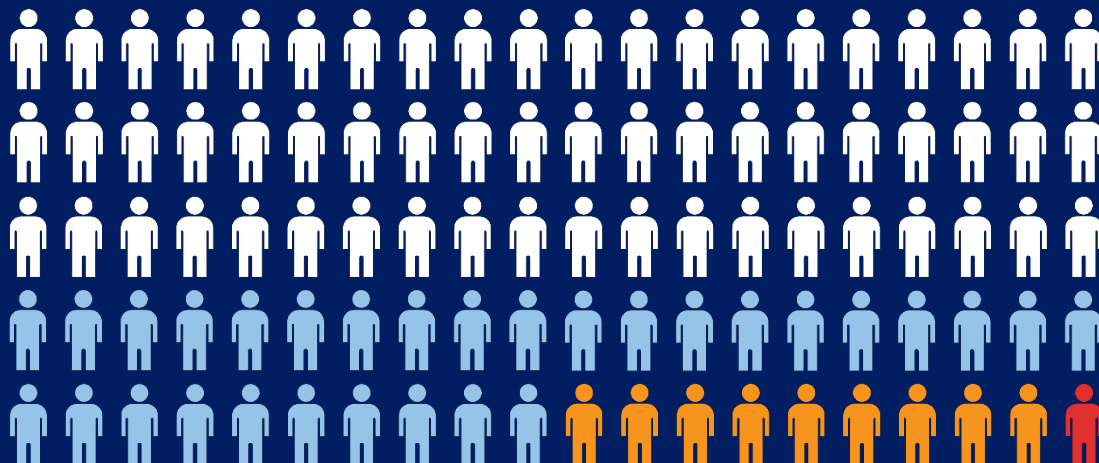


Hypothesis:

- Coccidioidomycosis is an immunogenic disease with fungal implications



Overview of Host-Pathogen Interaction



60%  Inhaled Valley Fever Spore & Have No Symptoms

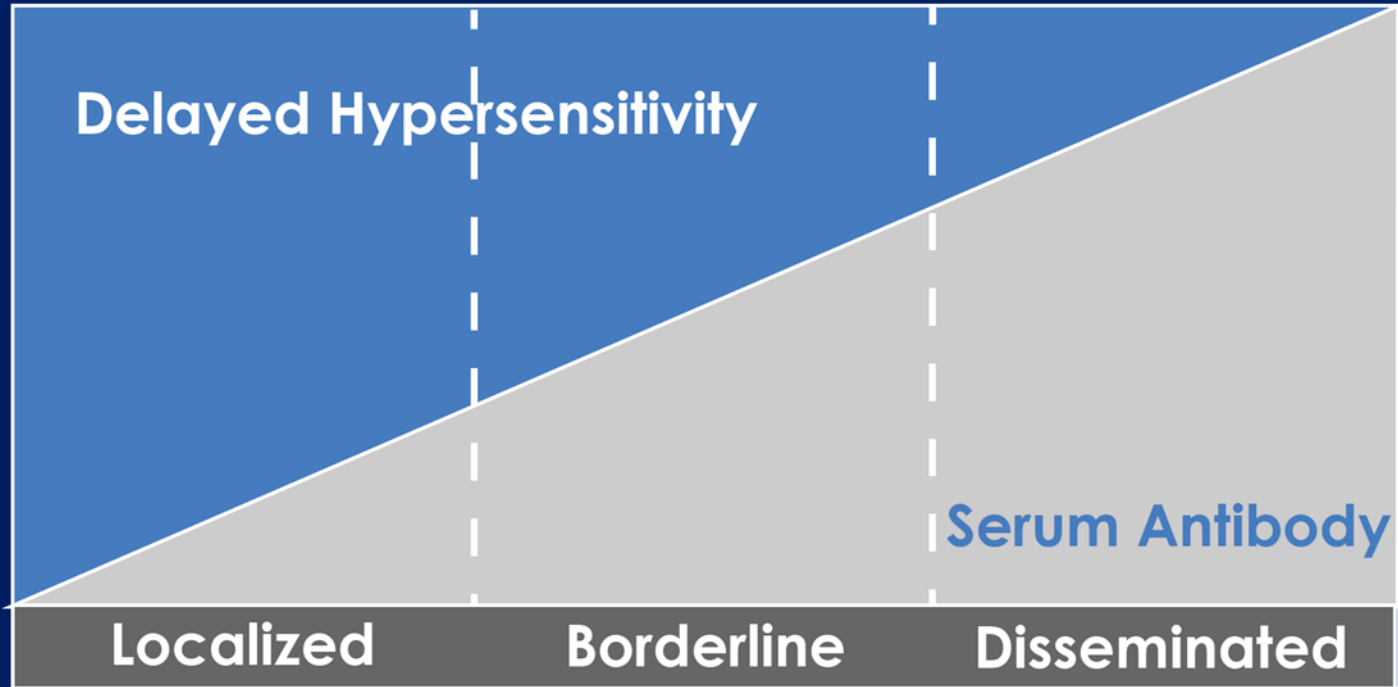
40%  Inhaled Valley Fever Spore & Have Flu Resembling Pneumonia Illness

10%  Inhaled Valley Fever Spore & Have Diagnosed Valley Fever

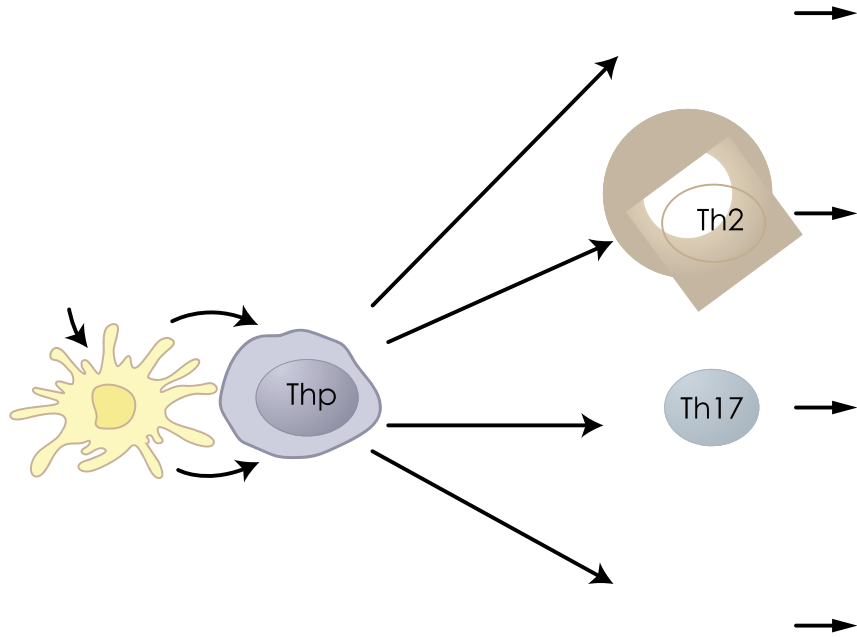
1%  Inhaled Valley Fever Spore & Have Severe Pulmonary Infection or Disseminated Cocci

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

Prognostic Clues & Opportunities for Novel Therapies



Coccidioidomycosis CMI



Source: Elenkov, I. Chronic Urticaria Linked to a Th2/Th17 Shift in Skin Lesions. May 7, 2016.

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
- ✓ Primary Pulmonary Coccidioidomycosis is always a possible diagnosis



Antimicrobial Stewardship

- ✓ Community Acquired Pneumonia is a disappearing disease
- ✓ Distinguishing between bacterial, viral, or cocci pneumonias is difficult. Patients often present with similar symptoms
- ✓ 5 days of antibiotics has been shown to adequately treat outpatient CAP



Antimicrobial Stewardship

✓ If the patient does not improve after 5 days of antibiotics, **THINK COCCI!!**

- ✓ Order a CMP, CBC with differential & cocci serology
- ✓ There should be no second course of antibiotics prescribed for pneumonia
- ✓ Consider an empiric antifungal
- ✓ Consider referral to an ID specialist
- ✓ Pneumonia with eosinophilia is probable Cocci





Hygeia, Greek Goddess of Health





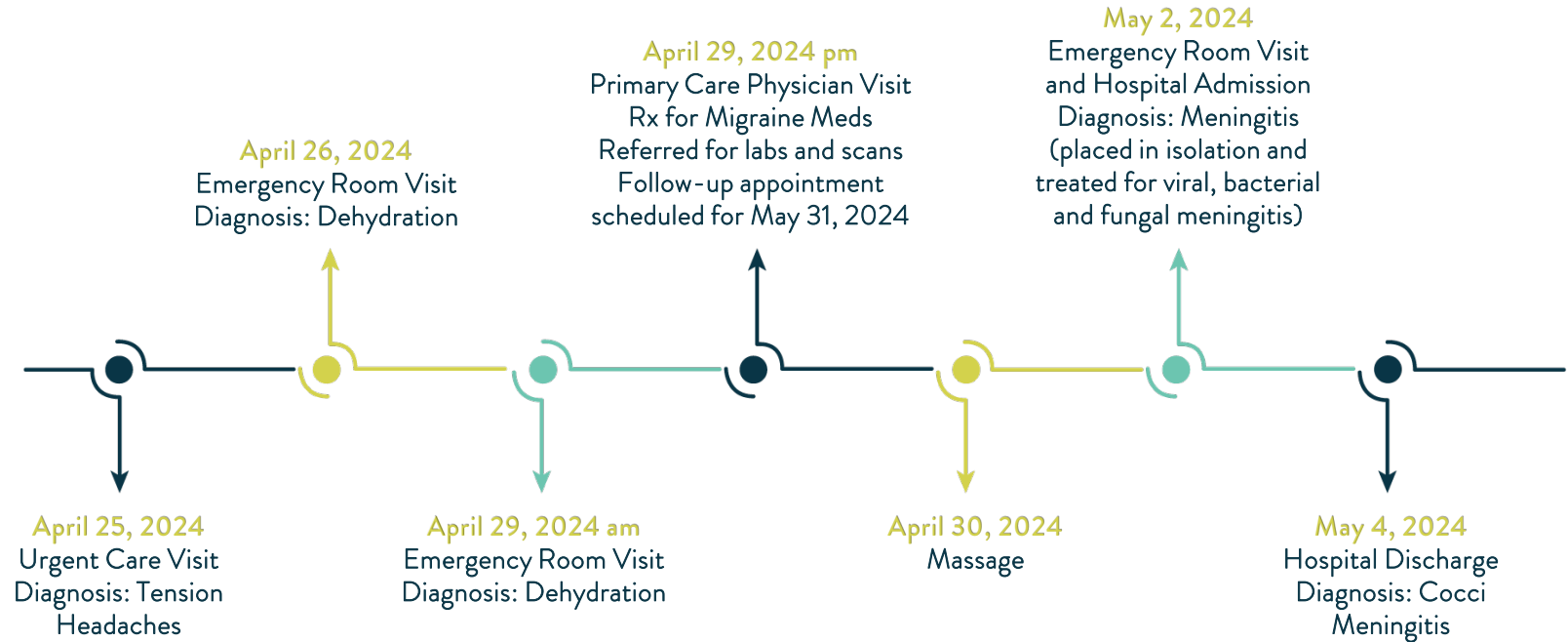
BRYNN'S STORY: **A PATIENT'S HEALTHCARE JOURNEY**

Brynn Carrigan, Director
Kern County Public Health

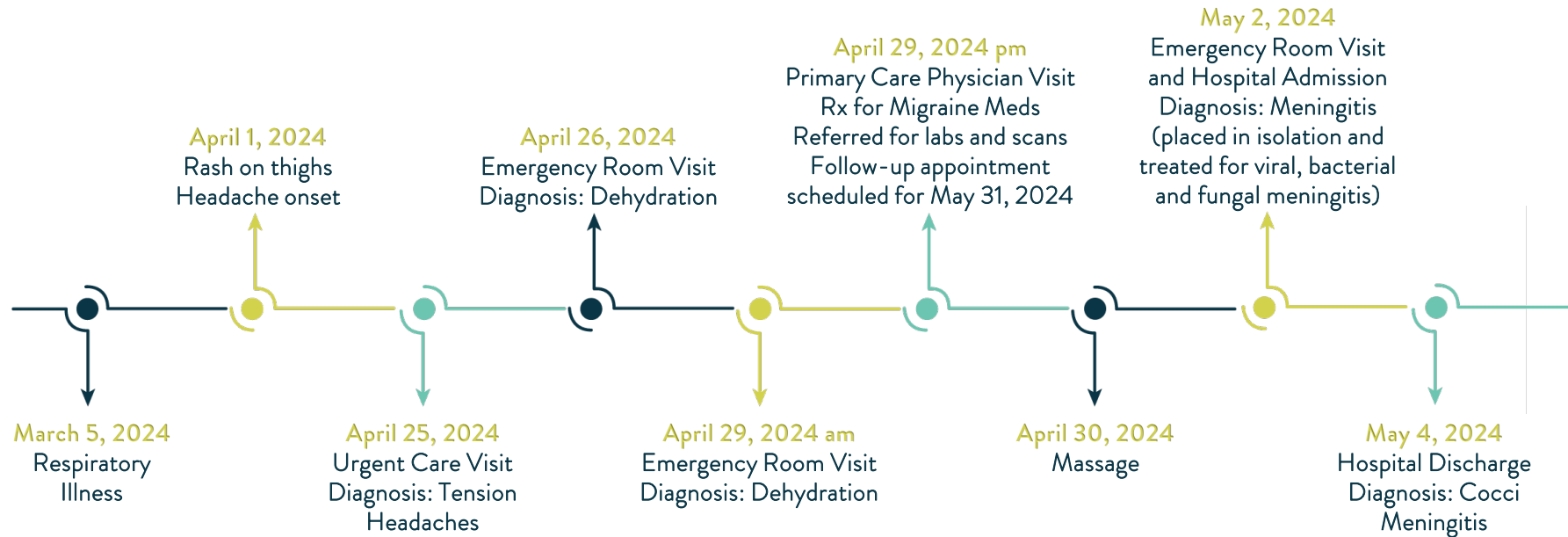
April 29, 2025

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Timeline of Healthcare Services



Timeline of Symptoms and Healthcare Services



Discharge Orders

Discharge Orders:

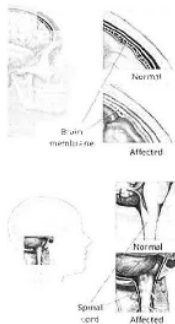
Discharge Today, Home or self care, after 6 PM dose of posaconazole

Case Management Instructions

Patient Discharge Goal:
Home

Education Materials

Bacterial Meningitis, Adult



Bacterial meningitis is a serious infection that affects the membranes that line the brain and spinal cord (meninges). This infection must be treated as soon as possible. It can get worse quickly and can cause permanent brain damage and long-term (chronic) problems, including seizures and hearing loss.

Cocci Meningitis

Kristopher Lyon, MD
Health Officer
Kern County Public Health

April 29, 2025

KERN PUBLIC
COUNTY HEALTH

Learning Objectives

- Describe the clinical presentation and outline the diagnostic workup for Valley Fever Meningitis.
- Interpret cerebrospinal fluid findings relevant to the diagnosis of coccidioidal meningitis.
- Apply clinical judgment to identify patients requiring testing based on residence in or travel to endemic areas.

Normal Course



Asymptomatic infection



Primary coccidioidal pneumonia



Extrathoracic coccidioidomycosis



Nonmeningeal



Meningitis

Presentation

- **Usually within weeks to months after primary infection**
- **Persistent headache: 75%**
 - **Progressively worsening headache**
 - **Unusual severity of headache**
 - **Associated symptoms**
 - **Nausea and vomiting**
 - **Blurred vision**
 - **Change in mental status**
 - **Back pain**



Subtle Symptoms

- **Have a high index of suspicion**
- **At presentation there may be minimal or no respiratory symptoms and chest X-ray may be normal**
- **Approximately 50% of those with meningitis will have extrathoracic lesions**
 - **Skin**
 - **Joint**
 - **Bone**
 - **Genital**
 - **Peritoneal**



Exam

- **“Typical” findings of bacterial meningitis not typical**
 - **Typically won’t have nuchal rigidity, Kernig or Brudzinski**
 - **Tremor can be present**
 - **Papilledema is frequent in children but not necessarily in adults**
 - **Can be somewhat more common later in the course in adults**
 - **Cranial nerve findings are typically a late finding**

Workup

- **CT Brain**
 - **Eval for alternative etiology but also can identify hydrocephalus**
- **MRI**
 - **Can identify vasculitis complications, leptomeningeal enhancement, outflow obstruction**
- **MRA**
 - **Rarely cocci meningitis can cause vertebral artery aneurysm**
- **Basic labs and serology**
- **LP**
 - **Use a blunt tip like Whitaker needle to decrease post-LP headache**

CSF Studies

- **Protein**
- **Glucose**
- **Cell count and differential**
- **Culture**
- **Biofire to rule out other pathogens**

Cocci Specific CSF Testing

- **CSF antibodies**
 - **Nearly as specific as fungal culture**
 - **Can occasionally get low level titers from non-meningeal infection**
 - **May not be present early on**
- **Fungal culture**
 - **Specify that you are looking for cocci so that lab staff can use appropriate biosafety measures**
 - **Only positive in about 15%**
 - **Culture of sediment from large volume taps may be more sensitive**
- **PCR testing**
- **CSF antigen**

Spinal Fluids	
☐ CSF Glucose	24 mg/dL (L)
☐ CSF Tube Num Chemistry	2 Tube
☐ CSF Protein	153 mg/dL (...)
☐ CSF Tube Num	2 Tube; 4 T...
☐ CSF Volume	6.0 mL; 6.0 ...
CSF Color	Xanthochr...
CSF Clarity	Slightly Ha...
☐ CSF RBC	245 Cell/m...
☐ CSF WBC	560 mm3 * (...)
☐ CSF Segs	11 %; 10 %
☐ CSF Lymph	50 %; 55 %
☐ CSF Monocyte	14 %; 12 %
☐ CSF Eosinophil	22 %; 22 %
☐ CSF Basophil	3 %; 1 %
Cocci IgG CSF	Positive (A)
Cocci IgM CSF	Positive * (A)
Microbiology/Serology	
EV Source.	CSF
Enterovirus Detection by RTPCR.	Not Detect...
COVID/Flu/RSV Source	Nasophary...
Influenza A, PCR	Negative *
Influenza B, PCR	Negative *
RSV, PCR	Negative *
COVID19/SARS-CoV-2 PCR Result	Negative *
Influenza A	Not Detected
Influenza B	Not Detected
Adenovirus	Not Detected
Human Metapneumovirus	Not Detected
Parainfluenza Type 1	Not Detected
Parainfluenza Type 2	Not Detected
Parainfluenza Type 3	Not Detected

Bordetella pertussis					Not Detected	10:30 PDT
Chlamydia pneumoniae					Not Detected	
Mycoplasma pneumoniae					Not Detected	
B. paraptus					Not Detected	
SARS-CoV-2 (COVID19) PCR					Not Detected	
Spec. Source					Nasophary...	
Cocci IgG						
Cocci IgG ELISA CSF.				1.0 IV * (H)	Positive (A)	
Cocci IgM						
Cocci IgM ELISA CSF.				1.8 IV * (H)	Positive * (A)	
Coccidioides Ab CSF by ID.				Not Detect...		
Coccidioides Ab CSF by CF.				< 1:2 *		
Coccidioides Ab, IgG.					1.5 IV * (H)	
Coccidioides Ab, IgM.					2.6 IV * (H)	
Coccidioides Ab by ID.					Not Detect...	
Coccidioides Ab by CF.					< 1:2 *	
ME Panel PCR Source				CSF		
Escherichia coli K1 PCR				Not Detected		
Haemophilus influenzae PCR				Not Detected		
Listeria monocytogenes PCR				Not Detected		
Neisseria meningitidis PCR				Not Detected		
Streptococcus agalactiae PCR				Not Detected		
Streptococcus pneumoniae PCR				Not Detected		
Cytomegalovirus (CMV) PCR				Not Detected		
Enterovirus PCR				Not Detected		
Human herpesvirus 6 (HHV-6) PCR				Not Detected		
Herpes simplex virus 1 (HSV-1) PCR				Not Detected		
Herpes simplex virus 2 (HSV-2) PCR				Not Detected		
Human parechovirus PCR				Not Detected		
Varicella-zoster virus (VZV) PCR				Not Detected		
Cryptococcus neoformans/gattii PCR				Not Detected		
Routine Cultures						
Culture Blood				See Report *	See Report *	

Management

- **Lifelong antifungal treatment**
- **Fluconazole 400–1200mg daily. 800mg is a typical starting dose.**
- **Itraconazole 200mg BID or TID**
 - **Requires monitoring and has more interactions**
- **Amphotericin B Intrathecal**
 - **Can be curative**
 - **Can be considered in first trimester pregnancy to avoid potential teratogenic effects of antifungals**
 - **Nicknamed Ampho-Terrible due to its severe side effects, nephrotoxicity and infusion related reactions**

Monitoring

- **Symptoms**
- **Serial titers**
- **Increased intracranial pressure may require VP shunt**
 - **However, risk for shunt failure**

Summary

- **Have a low threshold to screen patients for Cocci**
- **If headache that is atypical for the patient and positive serum cocci, have low threshold for LP**

Valley Fever Ambassadors:

Early Recognition and Collaboration with Public Health

Kimberly Hernandez

Division Director of Health Services

Kern County Public Health

April 29, 2025



Learning Objectives

- Categorize the role and function of Valley Fever Ambassadors
- Identify and access local resources available to providers and patients



Valley Fever Ambassadors

- Community champions who provide Valley Fever education to target audiences and the general public



- Trained on materials developed by leaders of Valley Fever Education to dispel myths around Valley Fever and ensure accurate information



Valley Fever Ambassadors

- Advocate for communication with healthcare providers



- Be a mechanism of support for patients and a force for change in the world of Valley Fever

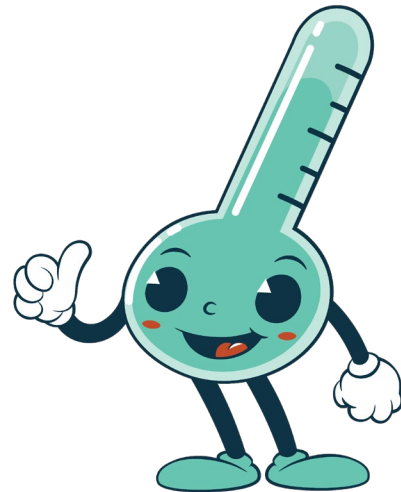
Expected Outcomes

- Increased general awareness
- Lower threshold to seek medical care
- Faster entry into medical care
- Provision of more thorough exposure histories
- More accurate descriptions of symptoms
- Ongoing engagement when symptoms persist despite other treatments
- Specific requests for assessment and testing

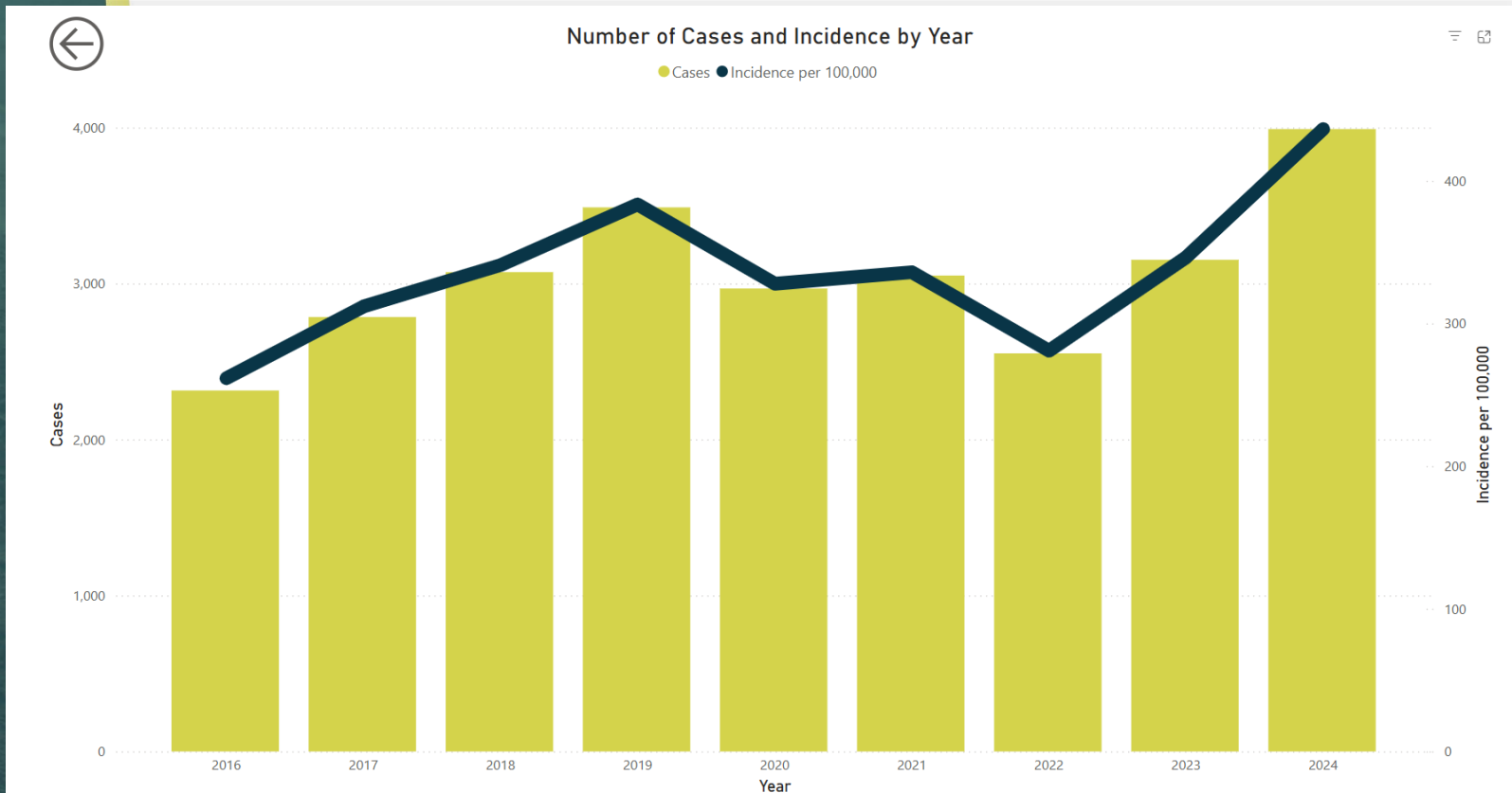
Where You Fit In

- Provide general education, particularly for patients with risk factors
- Regularly review patient risk factors
- Be ready for questions from patients
- Ask about exposure and symptoms
- Be patient with your patient's "suggestions"
- Order testing and imaging as appropriate
- Counsel and consult patients regarding treatment options as appropriate
- Be a Valley Fever Ambassador!

Collaboration with Public Health

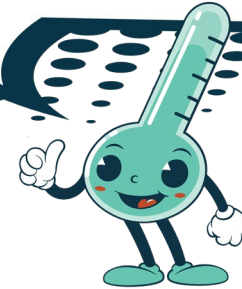


Local Data



Public Awareness and Outreach

- Public service announcements
- Billboards
- Broadcast and print news media



Faces of Valley Fever with
Joel Walton



Faces of Valley Fever with
Quon Louey



Faces of Valley Fever with
Brynn Carrigan

Materials and Resources

- Available in English and Spanish

IT'S IN THE AIR: BE AWARE

Valley Fever is caused by a fungus in dirt.

Airborne spores from disturbed soil can be inhaled and cause illness. Symptoms vary.

See a doctor if you think you have Valley Fever.



kernpublichealth.com
to learn more.

KERN
COUNTY
PUBLIC HEALTH

LA FIEBRE DEL VALLE "Cocci" Infección

El hongo generalmente infecta los pulmones, pero puede propagarse a otros órganos.

Las personas y los animales respiran las esporas de hongos del polvo presente en el aire.

Las esporas de hongos se dispersan en el aire cuando el viento o las excavaciones levantan suciedad y polvo.

El hongo de la Fiebre del Valle crece en la tierra y el suelo pero es demasiado pequeño para verlo.

CONSEJOS PARA REDUCIR EL RIESGO

- Mantenga las ventanas y puertas cerradas cuando hay viento afuera.
- Mantenga las ventanas del automóvil cerradas y utilice aire recirculado.
- Cubra las áreas abiertas de tierra para ayudar a reducir las áreas abiertas y polvorientas.
- Humedezca la tierra para reducir el polvo antes de cavar.
- Aljéjese del viento mientras cava.
- Si debe estar al aire libre en un ambiente polvoriento, use una mascarilla N95.

www.kernpublichealth.com

KERN COUNTY PUBLIC HEALTH

Valley Fever Institute at Kern Medical

VALLEY FEVER AMERICAS FOUNDATION

VALLEY FEVER

(also called coccidioidomycosis or "cocci")

Lingering cough, fever, or painful breathing for more than two weeks?

ASK YOUR DOCTOR ABOUT VALLEY FEVER

CONTRACTING VALLEY FEVER

Valley Fever is caused by a fungus that grows in the soil or dirt. You can get it by breathing in dust where the fungus grows. **ANYONE** can get Valley Fever. Even healthy people and pets.

Who is at risk of contracting Valley Fever?
People who spend time in dirt or dusty areas where the Valley Fever fungus grows may be at more risk of getting infected.

Who is at risk for severe Valley Fever illness?

- Adults 60+ years
- Pregnant women
- Diabetics
- People with weak immune systems
- African Americans and Filipinos

SYMPTOMS

Valley Fever symptoms can take 1-3 weeks to appear after breathing in the fungus. Valley Fever can affect people differently; some symptoms may resolve quickly, while others may take longer to go away.

- cough
- fatigue
- fever
- chest pain
- night sweats
- muscle or joint pain
- unexplained weight loss
- difficulty breathing
- headaches
- rash

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KERN COUNTY PUBLIC HEALTH

Valley Fever Institute at Kern Medical

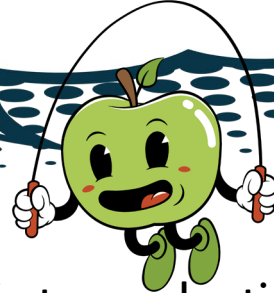
VALLEY FEVER AMERICAS FOUNDATION

Local Laboratory Testing

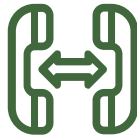


- Average 2-3 business day turn-around time
- Parallel testing of patient's most recent specimen, if available
- Highly specialized laboratorians
- Specimens sent from multiple states

Enhanced Surveillance



- Patient interviews
- Learn more about risk factors and activities
- Gauge patient awareness and understanding
- Learn more about barriers



Connection to Care

- Review of select positive laboratory results
- Referral to healthcare provider for follow-up



Thank You for Attending!
Please Complete the Survey!



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