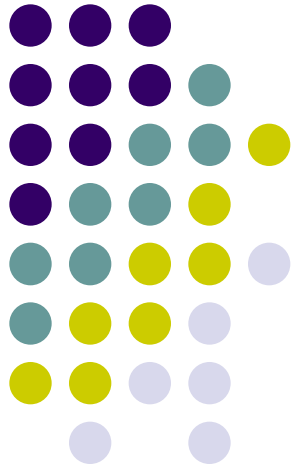
Coccidioidomycosis (Valley fever)

衛生署 疾病管制局
中區傳染病防治醫療網
王任賢 指揮官

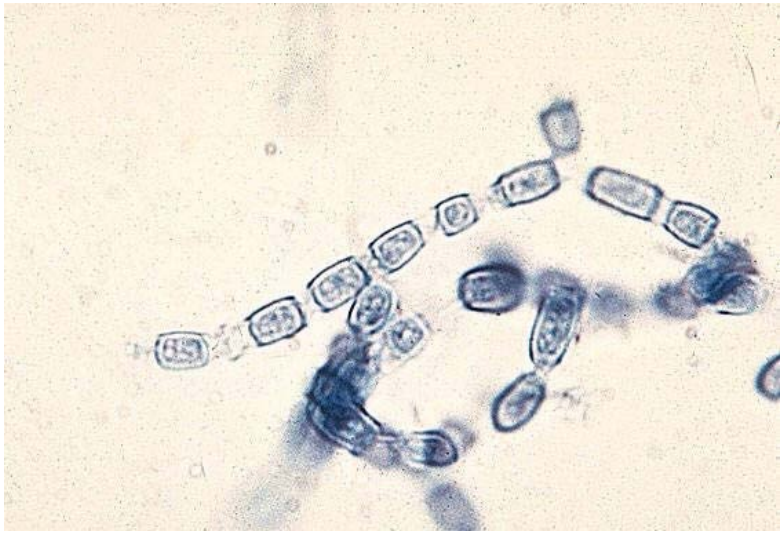


Overview

- What causes Valley Fever
- What is valley fever?
- How do you get valley fever and who is at risk?
- Where is valley fever found?
- What are the symptoms?
- Is there a cure for valley fever?
- Can I protect myself

What causes Valley Fever

- Cause
  - Coccidioides immitis is a mold that grows in the dirt during the wet season and spreads through the air during dry warm season
- Exposure
  - People inhale the spores of the fungus



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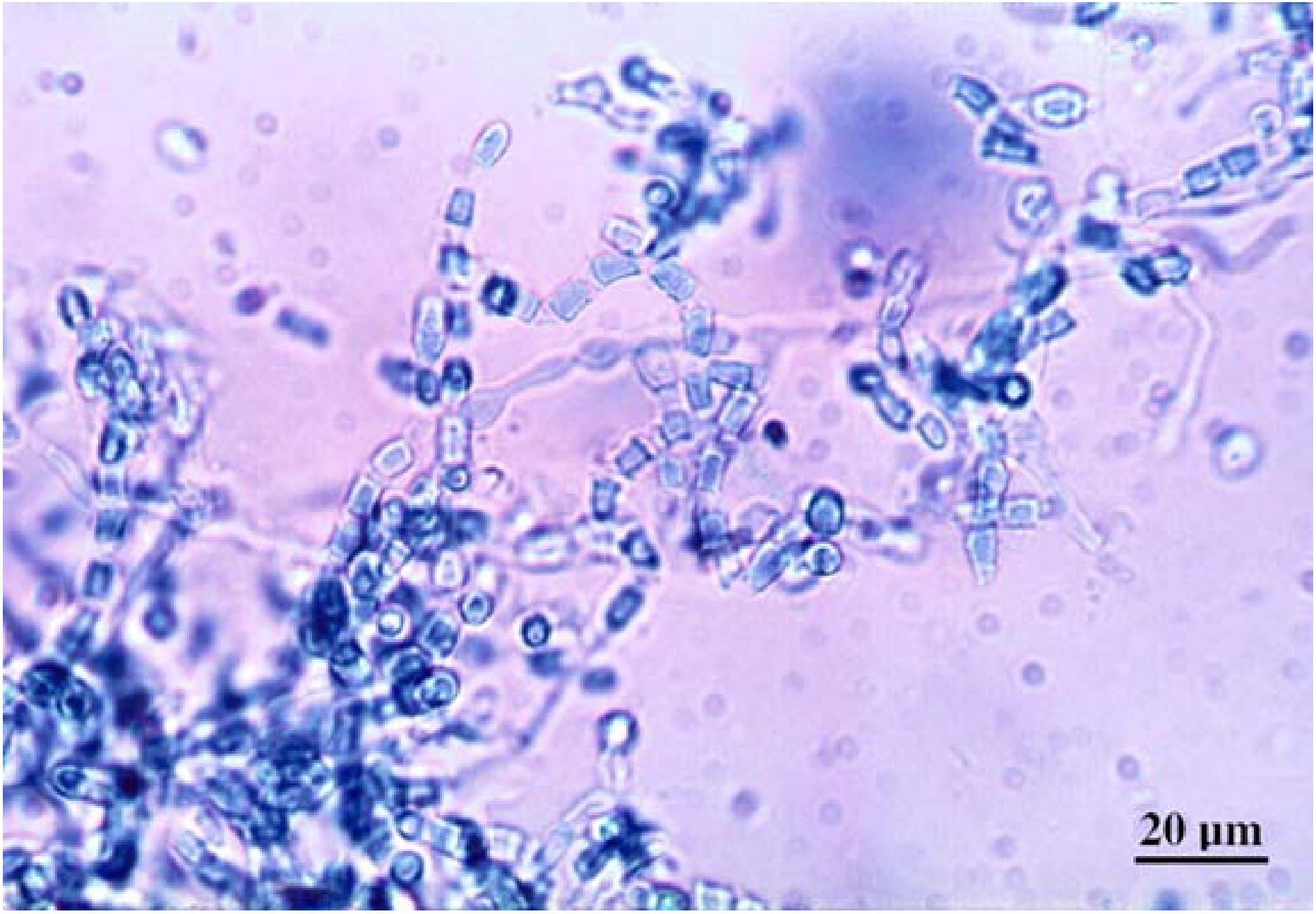
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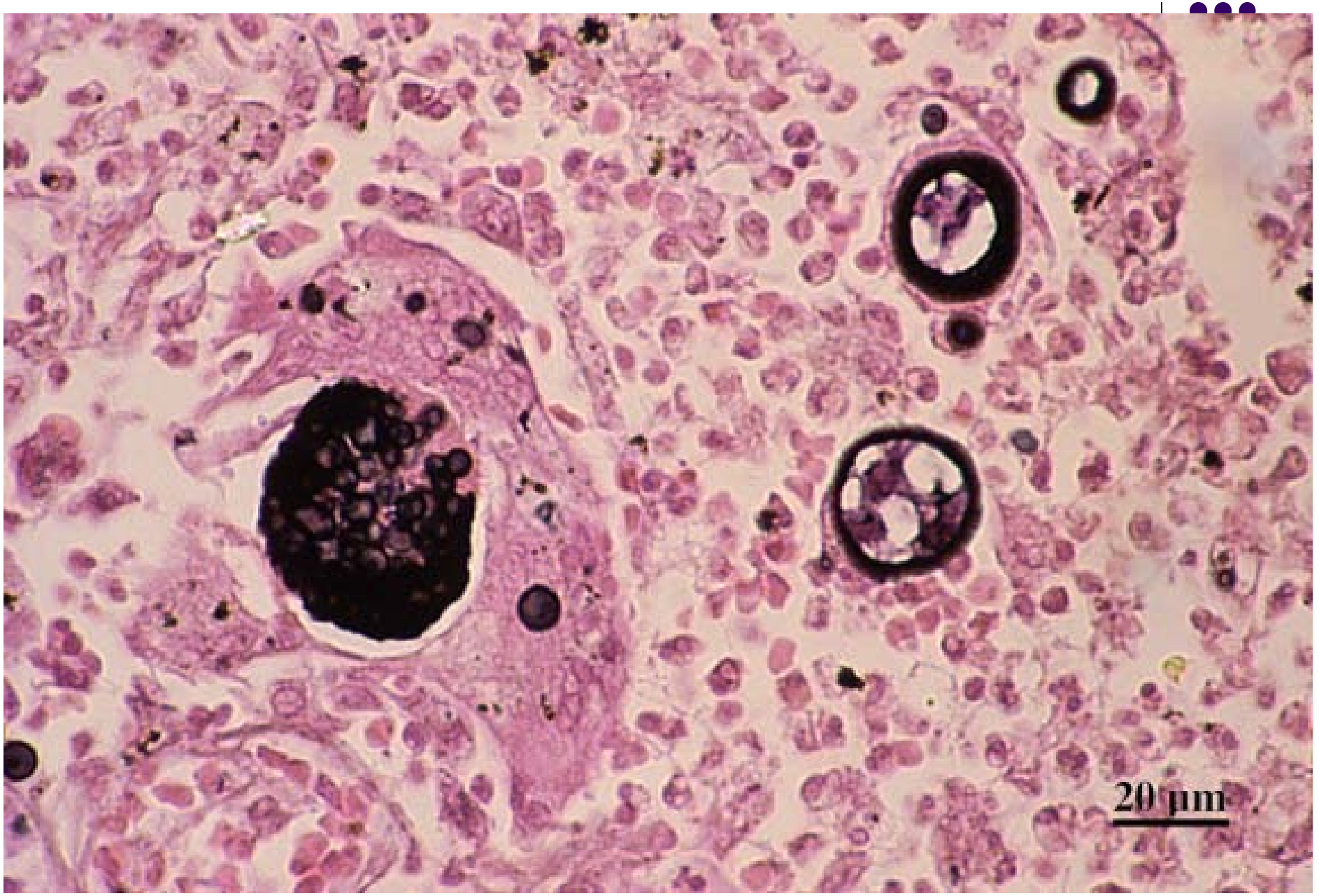
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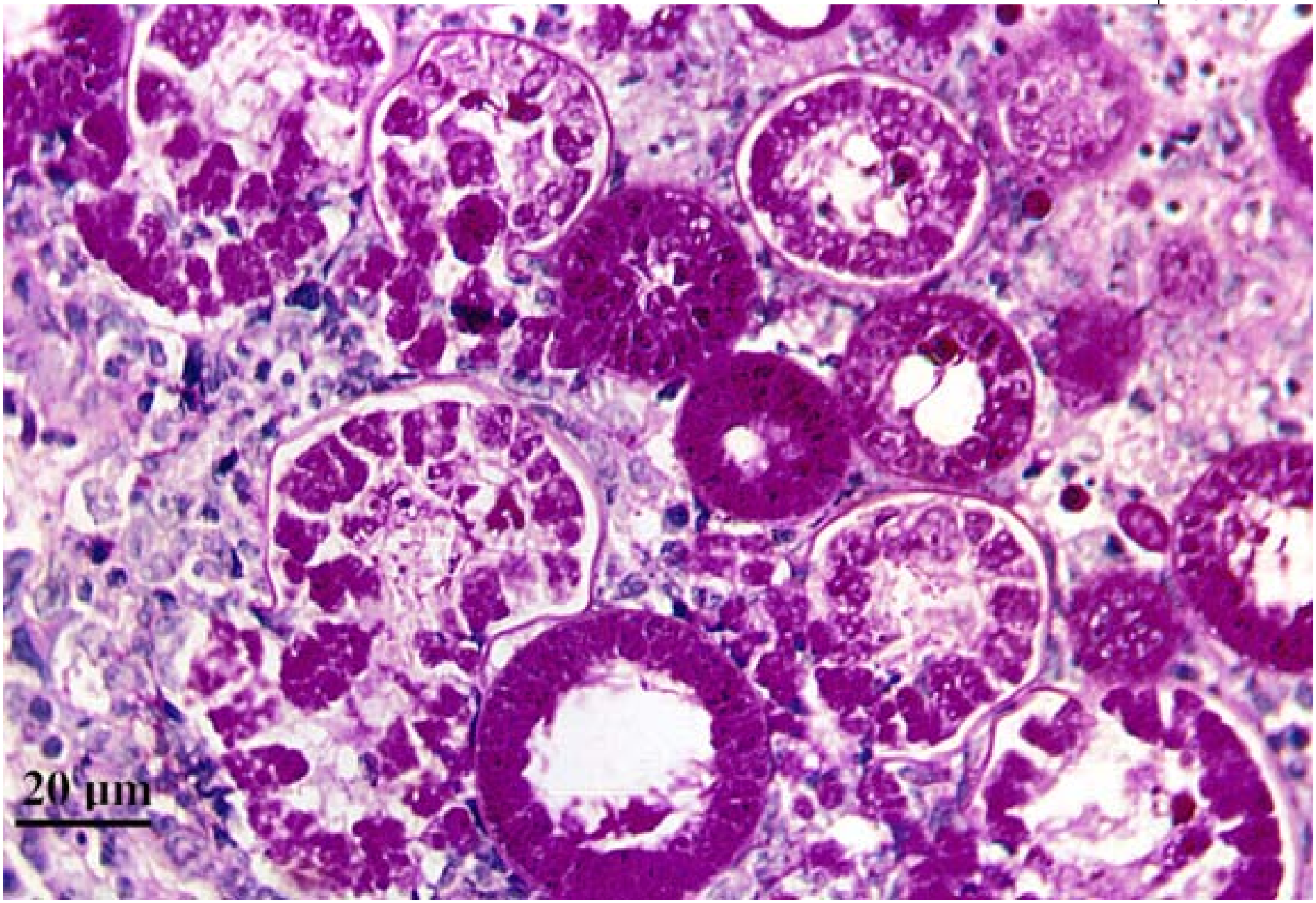
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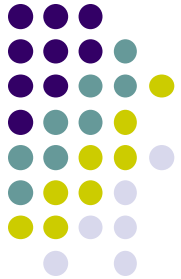
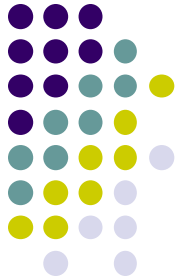
What is valley fever?



- Coccidioidomycosis was first discovered in the early 1890's in Domingo Ezcurra, an Argentinean soldier. Some pathologists believed his skin conditions were the result of cancer. After tissue biopsies his illness was thought to resemble the protozoan coccidia, often found in chickens -- and to this day the name of coccidioidomycosis still represents this early misdiagnosis. The Ezcurra case was followed for eleven years and he ultimately died of his illness.

What is valley fever?

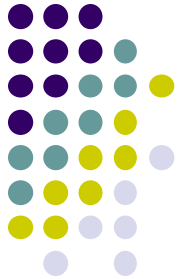


- Valley Fever is a lung infection. A fungus becomes airborne when dust around construction areas and agricultural areas is transported by the wind. When spores are inhaled, Valley Fever can result. The medical name for Valley Fever is *coccidioidomycosis*.

What is valley fever?

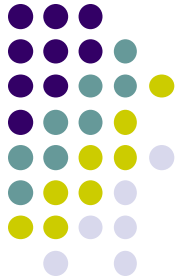
- Valley Fever is found mostly in the Southwestern U.S. where temperatures are high and the soils are dry.

How do you get valley fever and who is at risk?



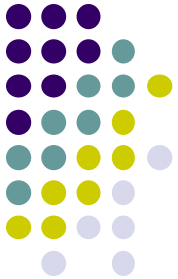
- Valley fever is spread through the air. The fungus spores get into the air when construction, natural disaster, like earthquakes, or wind disturbs the soil contaminated with the Valley Fever fungus. People breathe in the spores and then can get Valley Fever

How do you get valley fever and who is at risk?



- Valley Fever doesn't seem to play favorites, with all kinds of people at equal risk.
- Certain groups seem to have more instances of becoming seriously ill with Valley Fever
  - men
  - African Americans, Filipinos
  - people with problem immune systems
  - woman who are pregnant

How do you get valley fever and who is at risk?



- Construction workers, farm workers or others who spend time working in dirt and dust are most likely to get Valley Fever. You are also at higher risk if you are caught in dust storms, or if your recreation, such as biking or 4-wheeling, takes you to dusty areas. Also after a earthquake there is a danger of contacting valley fever. Construction, earthquakes or any recreation where you are in the dirt and dust. One thing you can do to minimize your risk of getting Valley fever is to wear a mask if you have to be out in blowing dust – but this is not completely effective since the spores are quite small. Basically, anyone who disturbs infected soil is at increase risk of contacting Valley Fever. Valley Fever is not spread from person to person. Although soil-disturbing activities put people at a higher risk, people could be infected by airborne spores at any time. Walking outdoors and leaving vents open in a car could even cause a lifelong infection.

Who gets Valley Fever

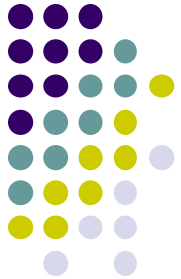
- Endemic regions
  - San Joaquin Valley
  - Sonora Desert
  - South America

San Joaquin Valley

貝克斯菲爾德
Bakersfield

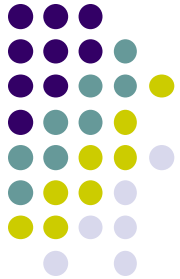
弗雷斯諾
Fresno

Where is valley fever found?



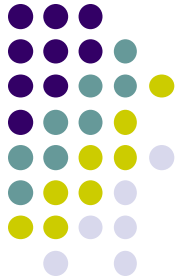
- The Bakersfield area in California is considered “hyperendemic” to Valley Fever. Most victims suffer without an adequate diagnosis, antifungal medications are frequently ineffective at resolving symptoms, and reactivations are common.

Where is valley fever found?



- Additionally, It is estimated that about one third of the people in the lower desert areas of Arizona have had Valley Fever at some point. Your chances of getting Valley Fever are about 1 out of 33, but the longer you live in the Desert Southwest the higher your chances of infection. There are about 100,000 new cases of Valley Fever each year. You don't have to live here to get it--people visiting or traveling through the area have been infected, too.

Where is valley fever found?

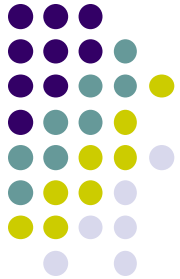


- The spores can also be blown hundreds of miles beyond an endemic region and can therefore infect people in other regions of the states.
  - Two thirds of all VF cases are in Arizona, with Phoenix and Tucson as the two most affected cities
  - Kern County (Bakersfield) is the most endemic area in California
  - There are also endemic areas in Mexico, Central America, and South America
  - Environmental conditions have been known to blow spores hundreds of miles out of their original endemic areas

What are the symptoms?

- Symptom of valley fever range from no symptoms (about 60% of the people)* to flu-like symptoms that can last a month. A small percentage of people (<1%) develop disease that that spreads outside the lungs to the brain, bone and skin. Without proper treatment, Valley Fever can lead to severe pneumonia, meningitis and death.

What are the symptoms?

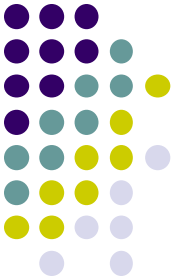


- About two thirds of the people who are infected never notice any symptoms, or experience mild symptoms and never even get treatment. Those who have sought treatment showed symptoms including fatigue, cough, chest pain, fever, rash, headache and joint aches. Sometimes people develop red bumps on their skin. In about 5% of the cases, nodules develop on the lungs which might look like lung cancer in a chest x-ray. A biopsy or surgery may be necessary to determine if the nodule is a result of Valley Fever. Another 5% of people develop what is referred to as a lung cavity. This is most common with older people, and more than half of the cavities disappear after a while without treatment. If the lung cavity ruptures, however, there may be chest pain and difficulty breathing.

What are the symptoms?

- Incubation period
  - It usually takes one to four weeks to develop symptoms of Valley Fever.

Is there a cure for valley fever?

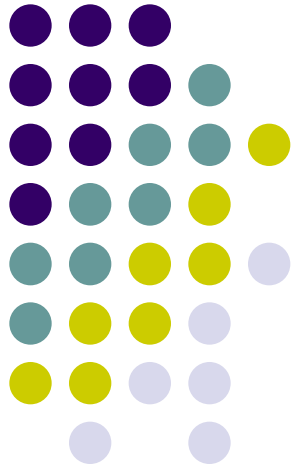


- There is no known cure for Valley Fever. However, In most cases of acute coccidioidomycosis, the body's own immune system is adequate to bring about recovery without medical intervention. Fever and pain can be treated with non-prescription drugs.
- Chronic and disseminated coccidioidomycosis often requires treatment with Fluconazole or Amphotericin B

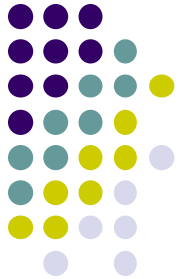
What are the symptoms

- Disease
  - Most people have no symptoms
  - 40% have flu symptoms including pneumonia
  - 1% have disseminated infection
    - Bones, skin and brain
  - Valley Fever is not contagious

Coccidioidal Meningitis

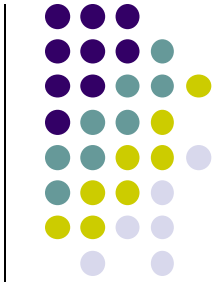


Case Presentation



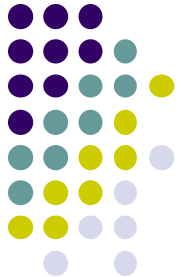
- A 56 year old male with history of persistent headache for several weeks
- Headache was gradual onset, constant and progressive in nature
- Pain is 6/10 to 8/10 refractory to medications (Motrin, Tylenol)
- Increase blurry vision and associated nausea and vomiting for 2 weeks
- Complain of lumbosacral back pain for 2-3 weeks

Case Presentation



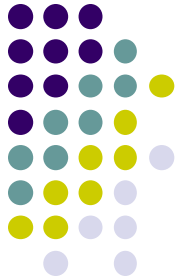
- Prior to headache noticed a persistence non-productive cough “that just wouldn’t go away” for 2 years
- Had mild sweating and fevers during the night but thought it was due to over exhaustion from work
- Went to a free health fair one year ago and got a PPD which was negative
- 10 pound weight loss over the past year without change in eating or exercise habits

Case Presentation



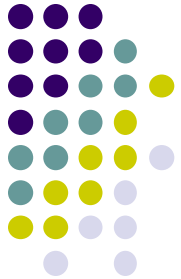
- Resident of small farming community in Southern part of Central Valley California since he was born
- Worked as a farm laborer since he was 16, mainly picking alfalfa
- Had neighbors with cough but thought it was seasonal allergies and their coughs went away after 3-4 months

Case Presentation



- CBC showed eosinophilia
- Lumbar puncture has increase opening pressure
- CSF studies showed very large numbers of leukocytes (2,000 cells / mm^3), some eosinophil were observed, protein ~ 1500 mg/dL and glucose was mildly decreased
- CSF serology showed IgG with 1:4 titers for coccidioidomycosis
- Blood serology showed IgG with 1:8 titers for coccidioidomycosis

Diagnosis: CSF

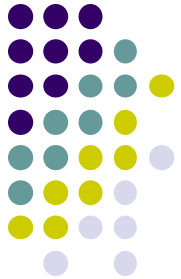


- Modest CSF pleocytosis usually occurs
- The cell count seen ranges from the low double-digits to > 10,000 cells/mm^3
- The majority of cells are typically lymphocytic, but a predominance of neutrophils could occur in acute onset of illness
- Eosinophils are not common, but when present, they are highly suggestive of the diagnosis
- The CSF protein level is almost always elevated; it is usually □ 150 mg/dL, and occasionally it can be measured in grams
- The CSF glucose level is usually depressed

Diagnosis: Definitive

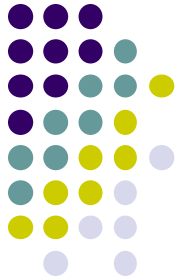
- The definitive diagnosis of coccidioidomycosis rests on the careful histopathologic identification:
  - Endosporulating spherulesa
  - Positive culture result with confirmation of *Coccidioides* species
  - Identification by serologic techniques
- Thus far, there is no antigen detection method for *Coccidioides* infection.

Diagnosis: Serology



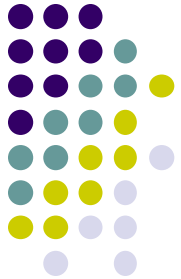
- Serologic examination is the mainstay of confirming the diagnosis
- A negative result of a serologic test cannot exclude the diagnosis
- Negative serologic test result for a patient with untreated disseminated disease is quite rare
  - An exception to this may be the patient with HIV infection or another severe immunocompromising illness
  - The measurement of coccidioidal antibodies in the CSF is considerably less sensitive but of greater diagnostic specificity
- In cases of meningitis having coccidioidal IgG antibody in CSF samples is virtually diagnostic

Diagnosis: Imaging



- CT of the brain without contrast can be used to diagnose hydrocephalus
- CT is not as sensitive as MRIs for the evaluation of the meningeal involvement or vasculitic complications
- An MRI as a baseline test is desirable for evaluation of the extent of the disease and for comparison purposes later in the course of illness
- Neuroimaging studies will reveal hydrocephalus in 30%–50% of patients at some time in the course of disease
- MRI with contrast enhancement is more sensitive at identifying the typical basilar cisternal enhancement
- Fifteen percent to 20% of patients will have evidence of vasculitic infarction
- MRI is also useful at identifying and evaluating spinal arachnoiditis
- A CT or MRI will rarely reveal an abscess or other focal brain complication of *Coccidioides* infection.

Therapy

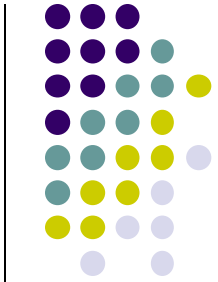


- The “Gold standard” treatment of coccidioidal meningitis was intrathecal amphotericin B deoxycholate since the 1950s
- There was some success with early azoles, including intrathecal miconazole and high-dose oral ketoconazole therapy
- Late 1990s fluconazole has become the new gold standard of therapy
- Although there are still debate there are two dosing schedules
  - Start with high-dose fluconazole at 800 to 1200 mg PO QDay then taper to 400mg PO QDay maintance dose
  - Start 400 mg of fluconazole PO Qday then increase the dose if clinical or CSF parameters fail to improve

Therapy

- In the initial stages of treatment for patients who start with regimens of fluconazole, clinical and CSF parameters should be monitored at least monthly
- As the parameters improve, the interval between follow-up visits and CSF analyses can be lengthened up to every 3 months
- Lapses in therapy and follow-up can have severe consequences – need to educate patients that therapy is life-long

Therapy



- The complication of hydrocephalus is usually treated by ventriculoperitoneal shunting
- In many patients, ventriculoperitoneal shunting is highly successful and provides long-lasting relief from this aspect of the disease.
- Other patients develop the problems of repeated distal obstruction, intraventricular foraminal obstruction, and the development of clinical shunt failure
- Any recurrent persistent headache, nausea and vomiting, gait disturbance, or change in mentation should be evaluated by CT or MRI

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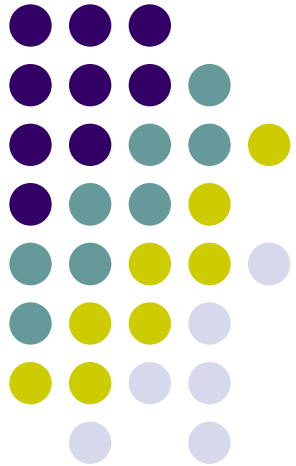


Facts and Myths: I

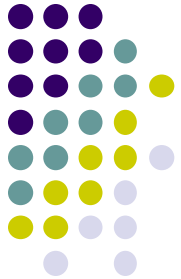
- MYTH: Valley Fever is a benign disease.
- FACT: It is not benign. It can destroy lives and it causes an estimated $120 million in expenses in the United States (Cocci Study Group Meeting, March 2001) and is also considered the world's most virulent fungal parasite.

Fromtling RA, Shadomy HJ. An overview of macrophage-fungal interactions. Mycopathologia 1986 Feb;93(2):77-93

Facts and Myths: II

- MYTH: Valley Fever only affects the people and animals of the desert Southwest.
- FACT: With millions of travelers from the United States and around the world entering this area, Valley Fever takes a global toll. With 300,000 members of the United States Armed Forces stationed in endemic areas, Valley Fever threatens military readiness. Animals are also at risk.

Facts and Myths: III



- MYTH: There already is a cure for Valley Fever.
- FACT: There is presently no cure for Valley Fever, nor significant funding for the research to find a cure. Once the fungal parasite has infected a person, it remains with that person for life. The drug nikkomycin Z may be promising, but to date has not received funding sufficient to determine whether it will be a successful cure. If symptoms of the disease have stopped, it is not truly cured but in remission or dormant. Reactivations are common so a cure could stop Valley Fever in all those already infected.

Facts and Myths: IV

- MYTH: A person or animal can only contract Valley Fever at certain times of the year.
- FACT: Although some weather patterns make Valley Fever outbreaks more likely, the spores can infect anyone at any time, 365 days a year. In addition to the VF spores that are blown about during dust storms, the spores are microscopic and can float unseen for a long time. These spores are a risk at any time of day, no matter how sunny and clear the sky may be

Galgiani JN. Coccidioidomycosis. West J Med. 1993 Aug;159(2):153-71

Facts and Myths: V

- MYTH: Since I am very healthy and have a great immune system, I don't have to worry about contracting VF.
- FACT: Valley Fever can harm anyone just by taking in the wrong breath of air. All it takes is the inhalation of one spore to cause a Valley Fever infection.

Nicas M, Hubbard A. A risk analysis for airborne pathogens with low infectious doses: application to respirator selection against Coccidioides immitis spores. Risk Anal 2002 Dec;22(6):1153-63

Facts and Myths: VI

- MYTH: Only immunocompromised people have severe cases of Valley Fever.
- FACT: Even entirely healthy people can suffer, be debilitated and die from this disease.

Pappagianis D. Clinical presentation of Infectious Entities. In Einstein, Hans E, Catanzaro, Antonio. (Eds) Coccidioidomycosis. Proceedings of the 5th International Conference on Coccidioidomycosis. Stanford University, 24-27 August, 1994. Washington DC: National Foundation for Infectious Diseases, 1996: p9-11

Facts and Myths: VII

- MYTH: I can't contract Valley Fever unless I visit an endemic region to VF.
- FACT: Spores can rest on objects like cotton, food, and clothing, resulting in infections thousands of miles away from endemic areas.

Drutz DJ, Catanzaro A: Coccidioidomycosis. Part I. Am Rev Respir Dis 1978 Mar; 117(3): 559-85

Facts and Myths: VIII

- **MYTH:** You can't contract VF just by driving through an endemic region.
- **FACT:** We have encountered several reports of people who had simply driven through the endemic regions and contracted serious and chronic cases of Valley Fever. We recommend people keep their windows and vents closed while driving through an endemic region. Please set your car's air conditioner to "inside air."

Facts and Myths: IX

- MYTH: You can't contract VF by flying on a plane that has stopped in an endemic region.
- FACT: The Department of Transportation noted that “passengers and cabin crew members boarded on an aircraft could be exposed to Valley Fever when the aircraft is grounded and the doors are opened for unloading passengers, baggage, and other materials.”

Geomet Technologies. Airliner cabin environment: contaminant measurements, health risks and mitigation options. Washington: US Department of Transportation, 1989

Facts and Myths: X

- MYTH: I must have had Valley Fever years ago. Everybody who lives here gets it so there's nothing anyone can do and therefore nothing to worry about.
- FACT: Unfortunately there *is* something to worry about because, once inhaled, there is no cure. Even if the infection is dormant it can activate at any time to sicken, debilitate, or kill a person who is infected. Also, proper dust control measures have proven that the number and severity of infections can be reduced, so there is definitely something people can do besides moving away from the endemic region.

Werner SB, Vugia DJ, Duffey P, Williamson J, Bissell S, Jackson RJ, Rutherford GW. California Department of Health Services' Policy Statement on Coccidioidomycosis. In Einstein, Hans E, Catanzaro, Antonio. (Eds) Coccidioidomycosis. Proceedings of the 5th International Conference on Coccidioidomycosis. Stanford University, 24-27 August, 1994. Washington DC: NFID, 1996: p363-372

Facts and Myths: XI

- MYTH: If I wear a bandanna or dust mask it will protect me from contracting Valley Fever.
- FACT: The microscopic spores that cause Valley Fever are approximately the same size as the spores that cause anthrax. They can slip through the tiny holes in a bandanna or a standard dust mask like marbles can pass through a fishing net. Only a NIOSH-approved N95 mask or better can provide some protection from the inhalation of spores this size.

Facts and Myths: XII

- MYTH: My VF infection was asymptomatic or mild so it can't come back again.
- FACT: Valley Fever has been known to activate or reactivate even four and a half decades after the initial infection, causing severe illness and death. It can reactivate many times.

Cocci Study Group, April 2002

Facts and Myths: XIII

- MYTH: Places like Arizona and California, where Valley Fever is endemic, are healthy places to visit and live.
- FACT: Valley Fever is estimated to infect well over 250,000 people annually in America's five most endemic counties. People in “hyper endemic” areas like Bakersfield, California are most likely to contact Valley Fever. Additionally, before 2006, 65% of America’s Valley Fever cases said to be contracted in Arizona. However, Arizona's caseload in 2006 is shaping up to be the worst Valley Fever epidemic in recorded history.

The fungus that causes Valley Fever is regulated as a biological weapon in the Antiterrorism and Effective Death Penalty Act of 1996 and the Public Health Security and Bioterrorism Preparedness and Response Act of 2002.

懇請賜教