

Valley Fever (coccidioidomycosis)

reprinted from univ. of arizona's valley fever center for excellence (www.vfce.arizona.edu), united states

What Is It?

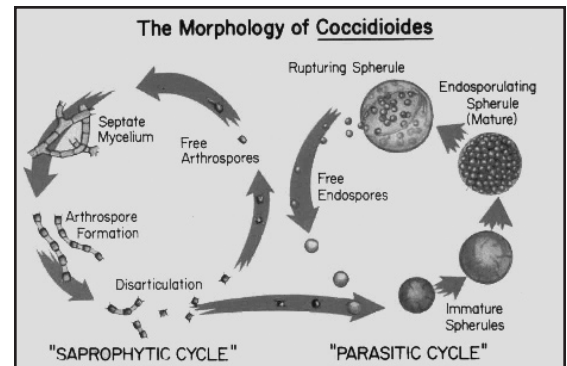
Valley Fever is primarily a disease of the lungs that is common in the southwestern United States and northwestern Mexico. It is caused by the fungus *Coccidioides sp.*, which grows in soils in areas of low rainfall, high summer temperatures and moderate winter temperatures. These fungal spores become airborne when the soil is disturbed by winds, construction, farming and other activities. Infection occurs when a spore is inhaled. Within the lung, the spore changes into a larger, multicellular structure called a spherule. The spherule grows and bursts, releasing endospores which develop into spherules. Valley Fever symptoms generally occur within three weeks of exposure. Valley Fever is not a “contagious” disease, meaning it is not passed from person to person. Second infections are rare.

Valley Fever derives its name from its discovery in the San Joaquin Valley of California, where it was also referred to as “San Joaquin Valley fever”, “desert fever” or “desert rheumatism”. The medical name for Valley Fever is coccidioidomycosis (often shortened to “cocci”, pronounced KOK-SEE), meaning a fungal infection (“mycosis”) caused by the fungus *Coccidioides*.

Valley Fever is prevalent in the San Joaquin and Central Valleys of California, and in the hot, desert regions of southern Arizona (especially in the Phoenix and Tucson areas), southern Nevada, southern Utah, southern New Mexico, western Texas (especially around El Paso), and Mexico (in the states of Sonora and Chihuahua). In addition, *Coccidioides* is found in semiarid and arid soils in Central and South America.

Valley Fever can be a serious illness. It is estimated that there are about 150,000 cases in the southwestern U.S. each year, most of which resolve on their own. In patients with serious complications from the disease and those with

DIAGRAM OF LIFE CYCLE



immunosuppression (including AIDS and organ transplants), diagnosis and treatment is often complicated and expensive, and current therapy is sometimes inadequate to cure patients. Additionally, many visitors from regions where Valley Fever is not endemic develop Valley Fever after returning home from the Southwest, and their physicians may not be familiar with the disease.

Who Gets It?

Anyone who lives, visits, or travels through the areas where the fungus grows in the soil (these areas are called endemic) may acquire Valley Fever. Military personnel who may be training in these areas are also at risk. People working in certain occupations such as construction, excavation, agricultural work, archaeological digging and other occupations which disturb soil in endemic areas may have an increased risk of exposure and disease. Persons who pursue recreational activities such as biking or driving ATVs or 4-wheel drive vehicles in the desert may also be at increased risk. Earthquakes that have occurred in endemic areas of California have also resulted in increased cases of Valley Fever. Many domestic and native animals are susceptible to

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the disease, including dogs, horses, cattle, sheep, burros, coyotes, rodents, bats and snakes. Dogs are especially susceptible and often need long-term therapy with antifungal medication.

Places in the US where Valley Fever infections are more likely to occur



Estimates indicate that in the United States more than 4 million people live in areas where the Valley Fever fungus is prevalent (or “endemic”) in the soils. About 80% of these people live in southern Arizona, which includes the Phoenix and Tucson metropolitan areas. Residents of Phoenix, Arizona and Bakersfield, California have shown positive skin-test reaction rates of 30-40%, meaning that about one-third of residents tested have had Valley Fever sometime in the past. Among those who have never had Valley Fever, the chance of infection is about three percent per year, but the longer one resides in an endemic area, the greater the risk. In the southwestern U.S., there are approximately 150,000 new infections each year. The fungal spores of *Coccidioides* are often found in abundance in the soil around rodent burrows, Indian ruins and burial grounds. In these settings, infections are more likely to be severe because of intensive exposure to a large number of spores. Many infections, however, occur in persons without occupational risks. Exposure to wind-storms or recently disrupted soils may increase the chances of infection.

Valley Fever infections are more likely to occur during certain seasons. In Arizona, the highest prevalence of infections occurs June through July and from October through November. In California, the risk of infection is highest from June through November, without the late summer break.

Symptoms

Most cases of Valley Fever are very mild. It is thought that over 60% of infected people have either no symptoms or experience flu-like symptoms and never seek medical attention. Of those patients seeking medical care, the most common symptoms are fatigue, cough, chest pain, fever, rash, headache and joint aches. Some people develop painful red bumps on

their shins or elsewhere that gradually turn brown (the medical term for these is “erythema nodosum”). These symptoms are not unique to Valley Fever and can be caused by other illnesses. Therefore, identifying Valley Fever as the cause of illness requires specific laboratory tests.

Most Commonly Reported Symptoms		
• fatigue	• fever	• rash
• cough	• headache	
• chest pain	• joint aches	

The usual course of disease in otherwise healthy people is complete recovery within six months. In most cases, the body’s immune response is effective and no specific course of treatment is necessary. About five percent of cases of Valley Fever pneumonia (infection of the lungs) result in the development of nodules in the lung. These are small residual patches of infection that generally appear as solitary lesions, typically one to one and a half inches in diameter, and often produce no symptoms. On a chest x-ray, these nodules resemble lung cancer. Unfortunately, it is usually not possible to make a definite diagnosis without removing a part or all of the nodule by bronchoscopy, needle-aspiration or surgery.

Another five percent of patients develop lung cavities after their initial infection with Valley Fever. These cavities occur most often in older adults, usually without symptoms, and about 50% of them disappear within two years. Occasionally, these cavities rupture, causing chest pain and difficulty breathing, and require surgical repair.

Range of Cases

- Inapparent: 60%
- Mild to Moderate: 30%
- Complications: 5%–10%
- Fatal: less than 1%

Of those patients with Valley Fever that seek medical attention, one to two percent develop disease that has spread (disseminated) to other parts of the body. The most common site of dissemination is the skin. Biopsies of skin lesions may reveal *Coccidioides* when grown in culture. Bones and joints (especially the knees, vertebrae, and wrists) are other frequent sites of dissemination. The changes in bones and joints due to Valley Fever infection can be seen on x-rays and in CT-scans of the affected body part. Meningitis is the most serious and lethal complication of disseminated disease. Symptoms include headache, vomiting, stiff neck, and other central nervous system disturbances. A spinal tap is required for a definite diagnosis of meningitis.

While there are no racial or gender differences in susceptibility to primary infection with coccidioidomycosis, differences in risk of disseminated infection do appear to exist. Men have a higher rate of dissemination than do women and several studies have shown that the rate of dissemination in African Americans and Filipinos is several times higher than in the rest of the U.S. population. Native Americans, Hispanics and Asians may also have a higher rate of dissemination than the general population, but these population differences are not well defined.

Others at increased risk of disseminated disease are those persons with immune system deficiencies. In areas of the southwestern U.S. where Valley Fever is endemic, it is one of the most frequent opportunistic infections among HIV-infected patients. Patients who are immunocompromised due to organ transplants, Hodgkin's disease, diabetes, pregnancy (3rd trimester), or chronic corticosteroid therapy also have an increased risk of developing disseminated disease.

Risk Factors for Disseminated Disease

- Immunosuppressed Patients
- Lymphoma
- HIV+/AIDS
- Adrenal Corticosteroid Therapy
- Diabetes
- Third Trimester Pregnancy
- Male
- African-American
- Filipino

Diagnosis

A diagnosis of coccidioidomycosis is suspected only if a patient is known to have had exposure to the disease through travel or residence in an endemic area. Diagnosis can be confirmed by (1) microscopic identification of the fungal spherules in an infected tissue, sputum or body fluid sample, (2) growing a culture of *Coccidioides* spp. from a tissue specimen, sputum or body fluid, and (3) detection of antibodies (serological tests specifically for Valley Fever) against the fungus in blood serum or other body fluids.

If the serologic test for Valley Fever antibodies is positive, the laboratory then performs a titer. A titer is a measurement of the amount or concentration of antibodies a patient is making against the fungus. An antibody is a protein that is produced in response to an antigen (a substance that causes an immune system response). An antibody is able to combine with and neutralize the antigen. A titer is obtained by doubling dilutions of the positive blood (1:4, 1:8, 1:16, 1:32 . . .) until the test becomes negative. The titer that is reported to your physician is the last positive dilution. While positive serological results almost always mean that a patient has Valley Fever, a third or more of patients with Valley Fever may actually have negative results. Therefore, it may be necessary to repeat the serologic test periodically.

Valley Fever skin tests* (called coccidioidin or spherulin, not currently available) indicate prior exposure to the fungus, but, because reactivity is



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lifelong, skin tests are not particularly helpful in diagnosing a current infection. Commonly, a routine chest x-ray will detect Valley Fever cavities in a person with no symptoms and who may be unaware of ever having had Valley Fever.

Risk Factors

Anyone who lives in, visits, or travels through the endemic area may contact Valley Fever. There is no evidence indicating any particular group of people is more or less likely to acquire Valley Fever. The chance of infection is approximately three percent per year.

Treatment

Most patients with Valley Fever recover with no treatment and will have life-long immunity. In severe cases, especially in those patients with rapid and extensive

primary illness, those who are at risk for dissemination of disease, and those who have disseminated disease, antifungal drug therapy is used. The type of medication used and the duration of drug therapy is determined by the severity of disease and response to the therapy. The medications used include ketoconazole, itraconazole and fluconazole in chronic, mild-to-moderate disease, and amphotericin B, given intravenously or inserted into the spinal fluid, for rapidly progressive disease. Although these treatments are often helpful, evidence of disease may persist and years of treatment may be required.

Although much attention has been focused on the use of herbs, vitamins, sulfur and other non-pharmaceutical treatments, there is no scientific evidence to support the use of alternative treatments.

Surgical removal of cavities in the lung from Valley Fever is sometimes necessary. Surgical drainage of Valley Fever abscesses in bones or joints is also commonly performed.

a note about this publication

This publication is reprinted here from another source (University of Arizona's Valley Fever Center for Excellence). We do not always have the resources at Project Inform to produce our own treatment information on every treatment topic. In these cases, we try to provide reliable information from other sources but cannot confirm that every fact in these publications is accurate. This information is designed to support, not replace, the relationship that exists between you and your doctor or medical provider.

TEXT LAST UPDATED: JANUARY 2007

Frequently Asked Questions

What is Valley Fever?

Valley Fever (medical name coccidioidomycosis or “cocci” for short) is an infection in the lungs caused by a fungus (scientific name *Coccidioides immitis*) that grows in the soil in the southern and central portions of California, Arizona, New Mexico, Texas and the southern portions of Nevada and Utah. Valley Fever is also found in parts of Mexico, Central and South America. These areas where the fungus grows in the soil are called endemic.

How do I get Valley Fever?

Valley Fever is acquired by inhaling one or more airborne spores of the fungus *Coccidioides immitis*. The spores are carried in dust particles from the soil by the wind when the desert soil is disturbed.

What is the incubation time?

Symptoms usually develop within 7-28 days after exposure.

Is there a chronic form of Valley Fever?

Yes. Patients with this manifestation present with chronic systemic symptoms such as low grade fever, weight loss, cough, chest pain and hemoptysis. These symptoms are often indolent and resemble tuberculosis when coupled with x-ray findings.

What is dissemination?

Dissemination is the spread of the fungal infection from the lungs to other parts of the body. The most common sites of dissemination in Valley Fever are skin, bones, joints and brain meninges. Cocci meningitis is the most lethal.

Is Valley Fever contagious?

NO! Valley Fever is contracted only by the inhalation of the fungal spores. Valley Fever is NOT spread from human to human, or animal to animal, or animal to human or human to animal. The spores change form in tissues of the body and are not contagious in tissue form.

Is there a cure for Valley Fever?

No. Researchers within our center and in the U.S. are working on the development of a prophylactic vaccine.

Who gets Valley Fever?

Anyone who lives, visits, or travels through the areas where the fungus grows in the soil (these areas are called endemic) may acquire valley fever. Military personnel who may be training in these areas are also at risk. People working in certain occupations such as construction, excavation, archaeological digging and other occupations which disturb soil in endemic areas may be at increased risk of exposure. Persons who pursue recreational activities such as biking or driving ATVs or 4-wheel drive vehicles in the desert may also be at increased risk. Earthquakes that have occurred in endemic areas of California have also resulted in increased cases of Valley Fever. Various domestic animals such as dogs and horses as well as wild animals are also susceptible.

I've lived in an endemic area for 10 years and am still skin test negative. Does this mean I have not had the disease?

You probably have not been in contact with the fungus. Skin test hypersensitivity usually remains life-long. Immunosuppression or an overwhelming infection may cause a negative response. Residents in the endemic areas of Phoenix, Arizona, and Bakersfield, California, have shown positive skin test rates of 30-40%, meaning that one-third of the residents tested had cocci sometime in the past. Among those who have never had Valley Fever, the chance of infection is about 3% per year, but the longer one resides in an endemic area, the greater the risk. In Southwestern U.S., there are approximately 100,000 new cases each year.

I had Valley Fever years ago. Can I get it again?

Usually a life-time immunity is acquired from an infection which means you don't get it again. However, occasionally, changes in the person's immune system brought about by other diseases or treatments which lower or suppress the immune system can allow a reactivation or reinfection.

Frequently Asked Questions, continued

Who is at risk of dissemination?

While there is no racial or gender differences in susceptibility or who contracts the primary infection, there are differences in risk of dissemination. Men have a higher rate of dissemination than women. African Americans and Filipinos have several times higher rate of dissemination in the U.S. Native Americans, Hispanics and Asians may also have a higher rate of dissemination than the general public. Others at increased risk of disseminated disease are those with immune system deficiencies such as organ transplants, Hodgkin's disease patients, diabetics, pregnant women in their third trimester, patients on chronic corticosteroid therapy or chemotherapy, cancer patients and HIV/AIDS patients.

I have asthma. Are my chances of getting Valley Fever greater?

No. The risk of contracting Valley Fever is no greater because you have asthma. You must inhale the spores from the fungus in order to become ill.

I have COPD. Are my chances of getting Valley Fever greater?

No. The risk of contracting Valley Fever is no greater for a person with chronic obstructive pulmonary disease than anyone else.

Are there times of the year when chances of contracting Valley Fever are greater than others?

Yes. Although blowing dust may carry the infectious spores of cocci anytime throughout the year, there are times which we call peak seasons for cocci. These vary with the seasons of the year and appear to be related to the amount of rainfall. In Arizona, the peak seasons occur from June through August and from October through November. In California, the summer months of June through August have the most cases reported.

I am immunocompromised because of AIDS. Is it OK to travel in an endemic area?

The risk is probably no greater than for anyone else. However, the longer you remain in an endemic area, the more chances of exposure. In Arizona, it is estimated that the average risk of annual infection of the resident population is 3%. That means each year only 3% of the susceptible population will contract Valley Fever. If you are particularly concerned about getting Valley Fever, try to avoid activities associated with dust and airborne dirt of native desert soil. Stay indoors during dust storms.

What are the symptoms?

Most cases (60%) have no symptoms or only very mild flu-like symptoms and do not see a doctor. When symptoms are present, the most common are fatigue, cough, fever, profuse sweating at night, loss of appetite, chest pain, generalized muscle and joint aches particularly of the ankles and knees. There may also be a rash that resembles measles or hives but develops more often as tender red bumps on the shins or forearms.

Are hives associated with Valley Fever?

No. The rashes and bumps that are associated with Valley Fever are an immunologic response to the infection, not an allergic one. The rashes are called erythema nodosum and erythema multiforme depending upon the presentation.

What is the Valley Fever skin rash like?

Valley Fever can cause rashes that look several different ways. A common presentation is as painful or tender, slightly elevated red nodules or bumps, which may change color to bluish to brown and often occur on the legs, but may occur on the chest, arms and back. Another common form of rash is a red raised rash which may have blisters or somewhat pointed pimple-like bumps. It's important to note that other diseases may also cause rashes that look the same. The names of the rashes are erythema nodosum (the most common) and erythema multiforme.

Frequently Asked Questions, continued

How long will I be sick?

The length of illness depends on the severity of the infection. As said before, most cases have no symptoms, others may take months to even more than a year to resolve. Persons frequently complain of fatigue and joint aches lasting months. The chronic forms of Valley Fever may last years, with a waxing and waning course.

How is Valley Fever diagnosed?

Diagnosis is obtained by use of a specific blood test (called a coccidioidal or cocci serology) which measures the level or titer of antibodies to the fungus. A positive titer is usually measured or reported in dilutions of the patient's serum that continue to react to the fungal antigen. Titers are reported as 1:2, 1:4, etc. In early disease, the cocci serology must be repeated in 2-4 weeks if negative because the antibody level is too low to be detected. Culture of sputum, tissue, biopsies, or body fluids or histopathologic (microscopic) evidence from the same sources are diagnostic.

How do I get a Valley Fever test?

The doctor must order the test for you.

Will a skin test diagnose Valley Fever?

No, a skin test alone is not helpful in most cases. A skin test for cocci (usually called coccidioidin or spherulin) indicates exposure to the fungus, but not when it happened. Reactivity is lifelong. An individual living in an endemic area and having a positive skin test could have been exposed years before being tested. However, a positive skin test on a patient from a non-endemic area, having recently returned from the Southwest or other endemic areas, probably would indicate recent exposure. Generally, a skin test is not considered a means of diagnosis, but a tool of epidemiologic studies.

Is a chest x-ray necessary if a cocci serology blood test is drawn?

The doctor uses the x-ray as a means of diagnosis as well as a means of following the progress of the disease.

Can Valley Fever be misdiagnosed?

Yes. Depending upon the symptoms, it may be confused with cancer, tuberculosis, chronic obstructive pulmonary disease, chronic fatigue syndrome and others. However, if the specific blood test to measure antibodies against the fungus is performed along with chest x-rays, travel history through the Southwest, and when appropriate skin test results are performed and considered, a diagnosis is made. The isolation in laboratory culture of the causative fungus from sputum, tissue or body fluids is diagnostic as is the presence of the diagnostic spherules as seen in histopathology.

I have pneumonia. Will antibiotics help?

Coccidioidal pneumonia is not treated with routine antibiotics (such as penicillin, cephalosporin, erythromycin) because it is caused by a fungus and "regular" pneumonia is caused by bacteria. There are antifungal medications that may be used to treat Valley Fever.

Why won't my doctor prescribe any medication when I feel really sick?

Before the availability of antifungal medications, the natural history of initial pulmonary infections was determined to resolve in at least 95% of patients. Studies have not been completed yet to determine if drug therapy hastens the resolution of immediate symptoms or prevents subsequent complications. The physician usually monitors the progress of the patient by chest x-rays, following the cocci serology (blood test) titer and the severity and duration of symptoms. This may require frequent visits to the doctor. If weight loss and night sweats continue, infiltrates in the lungs enlarge, and the inability to work persists, antifungal medication usually is considered.

Which antifungal medications are used to treat Valley Fever?

The "azole" family of antifungal drugs are frequently used. These are oral preparations of ketoconazole, itraconazole and fluconazole. Each have various side-effects and may be expensive. The azoles do not kill

Frequently Asked Questions, continued

the fungus but they control it. Amphotericin B is an antifungal medication that is used in serious and fulminant infections. It may be administered intravenously or intrathecally (injecting the medication directly into the fluid surrounding the brain).

What are the side effects of the antifungal drugs?

The common side effects of ketoconazole are nausea and vomiting, gynecomastia (enlargement of male breasts) and decreased libido. The common side effects of itraconazole and fluconazole are nausea, headache, skin rash, vomiting, abdominal pain and diarrhea. Side effects resulting from treatment with the azoles usually resolve with the discontinuation of the drug. Amphotericin B may have several side effects, most of which may occur during administration and then pass. Newer forms of Amphotericin B have been developed to ease symptoms during administration. Amphotericin B may affect the kidneys and requires close monitoring. Additional side effects with all antifungal medications may occur. Consult with your doctor, pharmacist and/or package insert for further details.

How long do I have to take antifungal medication?

The length of treatment depends on the severity of symptoms and disease and complications of the disease. Some patients take antifungal medication for a few months; others need life time therapy.

I read about a “sulfur cure”. Does it work?

There have been no studies to corroborate the claims made. The time period in which “cures” are claimed is probably the time that the body would recuperate on its own. The use of this product instead of medical care is not recommended.

The doctor says I have a cavity. Do I need surgery?

Cavities occur in about 5% of patients with pulmonary cocci. The typical cocci cavity is thin-walled and solitary. Coccidioidal cavities are commonly asymptomatic (do

not cause symptoms) and about 50% will disappear within 2 years of their occurrence. A cavity may persist for years with minor changes. About one-third of the patients with cavities may experience hemoptysis (coughing blood). The hemoptysis is often recurrent but generally not life-threatening. If rupture of the cavity is a large possibility, surgical removal may be necessary.

How do I prevent getting Valley Fever?

There is no prevention or vaccine at this time. Avoiding activities associated with dust and airborne dirt of native desert soil is recommended, but it is not a certain means of prevention. Some occupations recommend wearing masks. Use common sense and stay out of the blowing dust.

Will Valley Fever cause a positive TB (tuberculin PPD) skin test?

No. The tuberculosis and Valley Fever skin tests do not cross react. The presence of tuberculosis will not cause a positive cocci skin test nor will the presence of Valley Fever cause a positive tuberculin test.

What kind of doctors know most about Valley Fever?

Infectious diseases specialists are probably the most familiar with the disease depending upon in which part of the country you live. Pulmonary specialists and most primary care and family practitioners in endemic areas are versed in the diagnosis and treatment. However, physicians in other parts of the country seldom see cases of Valley Fever and, therefore, do not consider it in diagnosis unless a travel history through the Southwest is given. The patient should emphasize he/she knows about valley fever and wants to be tested. Should you desire a medical referral in your area, call the Valley Fever Center for Excellence (520) 629-4777. Your physician is also encouraged to call at the same number to consult about diagnosis and treatment with our specialist.

Frequently Asked Questions, continued

I don't live in an endemic area, but I need a Valley Fever specialist. How do I find one?

Call the Valley Fever Center for Excellence at (520) 629-4777 and we will try to find a referral physician for you.

What are lung nodules and do they go away?

Lung nodules are the result of pneumonia caused by Valley Fever. Nodules are small residual patches of infection that generally appear as single lesions, typically one to one and one-half inches in diameter. Patients who have no symptoms as well as patients who do have symptoms may develop nodules. Approximately 5- 7% of patients with cocci pneumonia will form sharply circumscribed singular nodules. If it is documented that the nodule is caused by valley fever, no other treatment is required. However, because the nodule may appear to be cancer, a biopsy or removal may be necessary. Nodules caused by cocci may remain a life- time.

When a person contracts Valley Fever, will he/she always show a scar on their chest x-ray?

Scarring is frequently found and correlates to the severity of illness. Many persons have such a mild case they have no symptoms and no scarring.

What does immunocompromised mean? How does this affect a Valley Fever infection?

A person is immunocompromised when his or her immune system (the body's defense against disease) is not intact. This may be the result of diabetes, chronic use of corticosteroids, cancer, chemotherapy, HIV/AIDS, organ transplantation, pregnancy or even aging. Usually the body is able to fight the fungus and recover without medication. If the immune system is compromised, it is unable to control the infection and allows the infection to spread from the lungs to other organs. The spread of infection from the lungs to other parts of the body is called dissemination.

What are spherules?

Spherules are the form that the fungus takes in tissue. In nature the fungus grows in soil and appears in the mycelial form similar to bread mould. Portions of the hair-like mycelia break off into arthroconidia ("spores") and become airborne when the soil is disturbed. The arthroconidia are extremely small and light and may be carried many miles by the wind. Fifteen trillion of the arthroconidia would fit into a cubic inch. There has been documentation of a severe dust storm occurring in Bakersfield, California, an endemic area, blowing as far north as San Francisco where it is not normally found, and causing an epidemic in the Bay area. The life cycle of *Coccidioides immitis* is drawn at the beginning of our website. It demonstrates the two forms the fungus takes. In the histopathology section of this website, additional microscopic photographs show the spherule form in tissue.

Is Valley Fever contagious from an open lesion?

No. The tissue phase of the fungus *Coccidioides immitis* is a spherule. The infectious phase is when the "spores" are inhaled from the air.

How can I boost my immune system?

Rest and good nutrition are recommended. Physicians may recommend some herbals.

Does the fungus lay dormant in the body?

In many cases the fungus does remain in the body. If the person's immune system is greatly immunocompromised, a reactivation of the disease may occur. This has been found to occur in many of the disseminated cocci patients with AIDS.

Do birds get Valley Fever?

In reviewing the records of the Arizona Veterinary Diagnostic Laboratory for the last 50 years and the scientific literature, we were unable to find a case of Valley Fever in any domestic, wild, or exotic avian species. From this, we conclude that Valley Fever does not cause disease in birds.

Frequently Asked Questions, continued

Do pigeons spread Valley Fever?

No.

Do chickens spread Valley Fever?

No.

Is Valley Fever contagious from animal to animal or animal to human?

Valley Fever is considered a noncontagious disease. Even if multiple animals or humans are affected in a household, each infection was acquired by inhaling spores from the soil.

Coughing cannot spread it between animals or people. In the case of draining lesions, the form of the organism in the fluid is not considered to be infectious to people or animals. Nevertheless, such lesions are best handled by bandaging. Bandages should be changed daily or every other day and discarded in outside waste containers to minimize risk of contaminating the environment.

For immunocompromised persons living in a household with a pet that has a draining lesion, it is best to consult your physician regarding this issue.

When does my dog need a Valley Fever test?

If your dog lives in a region where Valley Fever is typical, your dog could need a Valley Fever test for any illness that manifests the common clinical signs - coughing, fever, weight loss, etc. In addition, your dog will need some serum chemistries and white blood cell counts and sometimes x-rays to aid in diagnosing the illness. A positive test in and of itself is often not enough to diagnose Valley Fever.

For dogs that do not live in regions with Valley Fever but have traveled through or spent time in one, a Valley Fever test may be indicated for undiagnosed, unresolving illnesses. If your dog becomes ill outside the typical locations for Valley Fever, it is important to tell your veterinarian of your dog's travel history.

What is a Valley Fever test/titer and what does it mean?

A Valley Fever test, Cocci test, or Cocci titer checks the blood to see if your dog is making antibodies against the Valley Fever fungus. If the test is positive, it means your dog has been exposed to the fungus.

If the Valley Fever test is positive, the laboratory then performs a titer. The titer measures how much antibody your dog is making against the fungus. A titer is obtained by doubling dilutions of the positive blood (1:4, 1:8, 1:16, 1:32 . . .) until the test becomes negative. The titer that is reported to your veterinarian is the last positive dilution.

In broad terms, a higher titer is equated with more severe disease. However, some very sick animals have low titers, or even negative tests. For these dogs, other diagnostic tests are necessary for diagnosing the illness. X-rays, blood cell counts, biopsies, and microscopic examination of cellular specimens are a few of the tests your veterinarian may need to run.

Asymptomatic dogs (infected but not showing any illness) may also have low titers, such as 1:4 or 1:8, sometimes 1:16. The titer is helpful in diagnosing Valley Fever in sick dogs, but other tests are usually needed to confirm diagnosis.

Titers usually reduce over time as the animal's disease regresses. Dogs that start with low titers (1:4 or less than 1:4) may undergo little change in the titer. This is probably not to be interpreted that your dog is not getting well. Monitoring your dog's symptoms and other tests, such as blood counts and x-rays, will be better determinants of improvement in cases with low titers.

Some dogs will remain positive with a low titer for life. Continued treatment and monitoring of these animals needs to be determined by your veterinarian on a case by case basis.

What is the best treatment for Valley Fever?

Treatment choices vary by the individual veterinarian and patient. Reasons for choice of medication include practitioner's experience with the drugs, costs, side effects, efficacy, severity of illness, and convenience to the owner. If one medication is unsuccessful, another will often be tried.

Frequently Asked Questions, continued

For disease of the brain and spinal cord, fluconazole (Diflucan) is the drug of choice. Fluconazole is also the only drug that penetrates tissues of the eye and should be employed in ocular cases.

What is the proper dose of medications?

Your veterinarian is skilled in the diagnosis and treatment of your pet's illness. Should you feel that your dog is not responding or may have side effects to the medicine, you should first discuss your concerns with your veterinarian. If the results are not satisfactory, you can seek a second opinion.

What are the side effects of oral Valley Fever drugs (ketoconazole, itraconazole, fluconazole)?

Ketoconazole (Nizoral) has the highest incidence of side effects. Loss of appetite is the most common and may be severe in some dogs. Others include lightening of the haircoat (may grey in blacks), vomiting, diarrhea, elevated liver enzymes, and reduced fertility of males. Giving the drug with food may reduce gastrointestinal side effects as well as improving absorption of the medicine.

The coat color effects reverse with discontinuation of the medication (with the exception of a few black dogs this author has heard about that have remained grey).

Liver enzymes are monitored by routinely testing your dog's blood. If your veterinarian determines that they are significantly elevated, the medication may be stopped or the dose decreased.

Itraconazole (Sporanox) may also cause lack of appetite and GI signs, though with less frequency than ketoconazole. It may increase liver enzymes. Occasionally, itraconazole can cause ulcerated lesions of the skin. If this happens, a reduction in dose may clear it up, or your dog may need to be treated with a different medication. Monitoring of liver enzymes is as for ketoconazole.

Effects of itraconazole on coat color are unknown by this author but may be similar to ketoconazole in an occasional dog. Itraconazole is not known to affect fertility of males.

Fluconazole (Diflucan) has the fewest side effects. Gastrointestinal signs can occur, though are often mild, and elevations in liver enzymes are relatively uncommon. Unlike itraconazole and ketoconazole, fluconazole is mainly eliminated by the kidneys. Dose reductions may be needed in animals with poor kidney function. Liver enzymes also need to be monitored because of occasional problems with enzyme elevations. Fluconazole has minimal to no effect on male fertility.

All the oral Valley Fever drugs cause birth defects in fetuses and should be avoided in pregnant animals unless the benefit to the mother outweighs any risk to the fetuses.

Are there vitamins, nutritional supplements, or alternative therapies for pets with Valley Fever?

Most ill dogs could receive a pet multivitamin supplement safely and possibly with benefit to overall well-being. Vitamin C is often prescribed to be administered with ketoconazole. This aids absorption of the drug by helping to acidify the stomach and may also "boost" the dog's immune system. Use of the vitamin C should be checked with your veterinarian as high doses may cause gastrointestinal irritation.

Talk to your veterinarian about your dog's overall nutrition status and the nutritional goals you need to meet while your pet is ill. The more ill your dog, the more important it is to discuss this issue with your vet.

For dogs that will eat nothing at all, force feeding may be an option to attempt to meet nutritional needs. For help in determining if this drastic measure should be taken and what food should be used to implement it, talk to your veterinarian. Force feeding is a big commitment and an unpleasant venture for both dog and owner, but in occasional situations it may mean the difference between recovery and loss of the dog. If the dog's nutritional needs can't be met any other way, surgical placement of a feeding tube may be an alternative.

Alternative therapies, such as herbs or acupuncture, have not been scientifically tested against Valley Fever. If you wish to pursue alternative treatments, this au-

Frequently Asked Questions, continued

thor recommends you consult a veterinarian trained in holistic medicine. These professionals are your best source of help.

For cats, it is highly recommended that no herbs or supplements be given without the guidance of a veterinarian. Cats have a much different metabolism than dogs and what might be harmless in a dog could prove very toxic to a cat. For cats that won't eat at all while sick, surgical placement of a feeding tube may be necessary to make sure the cat does not develop fatty liver syndrome because of the lack of food intake.

Can Valley Fever relapse and can dogs be reinfected?

Valley Fever is well known to relapse in both humans and dogs. In particular, cases of disseminated infection have a 30-50% rate of relapse in humans, no matter how well the initial infection was treated. It is not known how many canine cases of Valley Fever relapse, but relapses are not uncommon.

In the case of a relapse, a return to medication is usually enough to make symptoms subside, but the dog may require several additional months of treatment. Dogs that experience more than one relapse or get very sick with the relapse should probably have lifetime treatment with medication considered.

Reinfections in humans are documented only rarely. It is not known at this time whether dogs are susceptible to reinfection.