

Recommendations for Coccidioidomycosis Mitigation in Prisons in the Hyperendemic Areas of California

Submitted by

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We would like to express our sincere appreciation to the following contributors for providing their scientific evidence and professional opinion that has helped form the basis for our recommendations about how to mitigate the impact of Coccidioidomycosis in California Correctional Institutions.

California Department of Health Services

Division of Communicable Disease Control

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Local County Health Officers

in the Coccidioidomycosis Hyperendemic Area

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Recommendations for Coccidioidomycosis Mitigation in Prisons in the Hyperendemic Areas of California

Executive Summary

This report builds on the information previously provided to the Receiver in the May 21, 2007 memorandum entitled *Prevention and Treatment of Coccidioidomycosis at Pleasant Valley State Prison – Background and Status Report*. This report summarizes the findings from the May 24th 2007 Valley Fever Symposium held in Bakersfield by the Kern County Health Department and includes additional recommendations for interventions that will help mitigate risk to patients. At the Symposium, representatives from the CDHS and seven County Health Officers¹ from within the hyperendemic area reported a significant increase in the rate of Cocci in their respective counties over the past several years.

On May 3, 2007, Assembly Bill 900 was chaptered. It authorized the California Department of Corrections and Rehabilitation (CDCR) to design, construct, or renovate prison housing units, prison support buildings, and programming space in order to add 7,484 beds.² Four of the ten prisons identified for expanded construction are in the Coccidioidomycosis (CM) hyperendemic area and include Pleasant Valley State Prison in Fresno County and Kern Valley State Prison, Wasco State Prison, and North Kern State Prison in Kings County. The Administration at CDCR has made reducing prison overcrowding a priority and is already planning an aggressive effort to implement the requirements of this statute.

In consultation with the California Department of Health Services (CDHS), the Division of Correctional Health Care Services has implemented several actions designed to reduce inmate and staff exposure to CM and mitigate its harmful effects. The statutory decision to construct additional prison beds the hyperendemic area creates some urgency in evaluating the current effort and making additional recommendations.

Consensus Recommendations from CDHS, Local County Health Officers, Academic Coccidioidomycosis Experts, and CDCR Medical Care and Public Health Consultants

After this important meeting, extensive discussion ensued to develop recommendations and a plan of action to reduce exposure to at risk inmates and staff and improve outcomes for those who develop Coccidioidomycosis while in the correctional setting.

Key Recommendations from the Local County Health Officers

At the end of the Symposium, the Health Officers made the following recommendations to health professionals within the CDCR:

1. Proceed with environmental mitigation in the prisons through landscaping with ground cover, and placing concrete and other dust reducing materials on the grounds;
2. Continue the diversion and relocation of inmates at high risk for CM;
3. Reinstate the public health system in prisons;
4. Notify the local Health Departments of new cases identified by prison providers;
5. Expand epidemiologic research around CM;
6. Support vaccine research; and
7. Do not expand prison beds in the hyperendemic area, especially at PVSP.

¹ The seven Health Officers were: B. A. Jinadu, MD – Kern County, Michael MacLean, MD – Kings County, Ed Moreno, MD – Fresno County, Robert Levin, MD – Ventura County, Karen Haught, MD – Tulare County, Karen Furst, MD – San Joaquin County, and Greg Thomas, MD – San Luis Obispo County

² The bill also permits CDCR to acquire land, design construct, and renovate reentry program facilities and to construct and establish new buildings at facilities under the jurisdiction of the department to provide medical, dental, and mental health treatment housing for 6,000, as specified.

Key Recommendations from the CDCR Medical Care and Public Health Consultants

Immediate

1. Implement environmental mitigation techniques at PVSP based upon the best available data; both indoors and outdoors.
2. Consider providing the same outdoor mitigation to Avenal, Corcoran and SATF after determining if the incidence of CM in these prisons warrants this effort.
3. Defer any new construction that will lead to additional prisoners being housed in the hyperendemic area.
 - a. Provide indoor recreation area for inmates to use during high wind/dust events;
 - b. Any retrofitting must be done using dust mitigating construction methods.
4. Continue to exclude all of the following inmates from being housed in a facility that is in the hyperendemic area³ including: HIV infected with a T-cell count less than 250, history of lymphoma; status post solid organ transplant; chronic immuno therapy (e.g. severe rheumatoid arthritis); chronic lung disease requiring oxygen therapy; and cancer inmate-patient on chemotherapy.
5. A request has been sent to Dr. Gil Chavez, Deputy Director of the CDHS Division of Preventive Health to ask Dr. Jean Yuan, from CDHS, to return and perform an analysis of the Coccidioidomycosis cases that have been diagnosed in the first quarter of 2007 to see if any new at-risk groups can be identified.
6. Continue to partner with Local Health Officers, CDHS, and subject matter experts on this issue.

Near Future

1. Expand the exclusion criteria to include all inmates who are HIV infected and have moderate and severe Chronic Obstructive Pulmonary Disease.
2. Perform a re-analysis of all new cases to determine the results of prior mitigation efforts.
3. Implement additional control measures as determined by results of ongoing analysis.
4. Provide additional education to all CDCR employees working and/or living in the hyperendemic area.
5. Support the development of a vaccine effective against CM.
6. Have all CM lab specimens sent to either Kern County PH Laboratory or the UC Davis Coccidioidomycosis Serology Laboratory for analysis; provide clinical information to the lab.
7. Establish a Coccidioidomycosis Working Group, including CDCR public health/communicable disease specialists and representatives from the Division of Communicable Disease Control and the Environmental Health Investigation Branch at CDHS, UCSF (Dr. Rutherford – Vaccine Project), and UC Davis Coccidioidomycosis Serology Laboratory (Dr. Pappagianis), and the Local Health Officers from the hyperendemic area to design, develop, implement and evaluate a comprehensive program to contain and reduce the rate of Cocci in inmates and staff at the CDCR.
8. Collaborate with the CDPH and Cal EPA to establish a measure for dust pollution in the air that can be used to indicate when staying indoors or wearing a mask while outdoors is recommended – similar to the air index used to warn those with vulnerable conditions to stay in on high smog pollution days.
9. Collaborate with Cal OSHA and CDPH in identifying staff issues and their mitigation for the hyperendemic area – include unions in this discussion.

Long term goal

1. Work toward the goal of not housing or employing any non-immune individuals in the hyperendemic area. This may depend upon technology that is not yet readily available, including immunization and/or reliable methodologies to determine who has previously been infected.
2. As part of future planning for centralized dialysis services, all dialysis patients will be located outside of the hyperendemic area. Patients will be moved once it can be done safely.
3. Based on the best scientific evidence, determine a minimum acceptable rate of Coccidioidomycosis (e. g. a rate equal to or less than the local community) for prisons in the hyperendemic area.
4. Evaluate the effort to reduce exposure and disease at PVSP. If no significant improvement is made, consider relocating all inmates from this institution to institutions with rates of Coccidioidomycosis equal to or better than their local community rates.

³ As per memorandum of August 3, 2006, "INMATE-PATIENTS AT HIGH RISK OF VALLEY FEVER EXCLUDED FROM SPECIFIC CENTRAL VALLEY INSTITUTIONS".

**Reported Cases of Coccidioidomycosis
For
Fresno and Kings Counties¹
May 24, 2007**

Percent of County Cases Reported by State Prisons

FRESNO COUNTY

REPORTED CASES				
YEAR	Fresno County Total	Coalinga- Civilian Total	PVSP Total	Prison % of County Cases
2002	84	4	47	56%
2003	140	23	107	76%
2004	122	6	70	57%
2005	290	42	100	35%
2006	776	154	520	67%
2007*	171	23	79	46%

* Through March 2007

KINGS COUNTY

REPORTED CASES					
YEAR	Kings County Total	Civilian Total	LNAS	Avenal and Corcoran Totals	Prison % of County Cases
2000	11	5	0	6	55%
2001	32	13	1	18	56%
2002	50	24	3	23	46%
2003	42	19	8	15	36%
2004	84	29	17	38	45%
2005	126	54	-	72	57%
2006	168	34	21	113	67%

¹ Provided as a handout at the May 24, 2007 Valley Fever Symposium by the Kern County Health Department in Bakersfield CA. These numbers may vary from the information provided by the UC Davis Coccidioidomycosis Laboratory as they are collected using two different methodologies.

**Coccidioidomycosis* in Inmates of California Correctional Institutions
2000 to Jan-Apr 2007**

Prison Bold = Prison in hyperendemic area	Year Opened	2000- 2001 **	Mar 2003 to Feb 2004	2005	2006	Jan through Apr 2007	TOTAL by Prison
Pleasant Valley (Coalinga)	1994	-	127+1 ****	150	514	137***	929
Avenal	1987	36****	22+ 1 ****	47	91	23	220
Corcoran State Prison	1988	14	21	23	12	7	77
Corcoran (SATF)	1997	-	-	2	22	7	31
CMC – San Luis Obispo		16	7	3	12	5	43
Vacaville (CMF)		8	1	-	2	-	11
CSP Solano		-	-	4	2	1	7
Mule Creek (Ione)		-	-	-	1	2	3
Chowchilla (Women's)		-	1	-	-	-	1
Ironwood (Blythe)		1	3	1	3	-	8
Chuckawalla Valley (Blythe)		1	1	-	1	1	4
Soledad CTF		-	-	5	4	1	10
Susanville		-	-	-	1	-	1
Centinela (El Centro)		-	-	-	-	1	1
CSP Sacramento/Folsom 2		-	-	-	-	1	1
North Kern SP	1993	-	-	1	-	-	1
Wasco	1991		1	-	-	-	1
Miscellaneous		10	18	8	-	-	36
Camarillo		-	-	-	1	-	1
Ventura Youth Authority		23*****	5	-	6	-	34
TOTAL		109	209	244	672	186	1420

* Using positive serum test for Coccidioidomycosis as bases for diagnosis

** In some instances, onset of disease may have been earlier in 2000

*** April = 23 cases

**** One case in prison employee

***** Note: The CYA cases in 2000 were in inmates who had been assigned to fight grass fires in McKittrick in the highly endemic area of Kern County.

Note 1: CA Correctional Institute (CCI) and Kern Valley State Prison (KVSP) are the two other prisons in the Hyperendemic area and do not have cases documented in this table.

Note 2: Data in this table may vary from the data in Attachment 1 – they are developed using two different data sources.

Note 3: This Attachment was compiled from Tables developed by D. Pappagianis, M. D., for the May 24 2007 Valley Fever Symposium

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 - ii. Michael MacLean, MD – Kings County,
 - iii. Ed Moreno, MD – Fresno County,
 - iv. Robert Levin, MD – Ventura County,
 - v. Karen Haught, MD – Tulare County,
 - vi. Karen Furst, MD – San Joaquin County, and
 - vii. Greg Thomas, MD – San Luis Obispo County
 - c. History of Valley Fever by Hans Einstein, MD, MPH, Kern Medical Center
 - d. The Burden of Valley Fever on Individuals by Royce Johnson, MD, Kern Medical Center.
 - e. Valley Fever Societal Costs by John Caldwell, Pharm. D., Kern Medical Center.
 - f. Vaccine Development, Research and Funding by George Rutherford, MD, MPH
 - g. Epidemiology and Testing for Valley Fever – Panel
 - h. Epidemiology of Valley Fever by Mark Starr, DVM, NPVM
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Coccidioidomycosis in California State Correctional Institutions

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ABSTRACT

Coccidioidomycosis (CM) has been recognized in inmates of California State prisons since 1919. CM has been diagnosed in inmates of various correctional facilities inside and outside the known endemic areas. In recent years construction of new prisons within endemic areas has led to an increase in the number of cases of CM. In the years 2005 and 2006, particularly affected have been the Pleasant Valley State Prison (PVSP) near Coalinga and Avenal State Prison (ASP) near Avenal on the Western side of the San Joaquin Valley. In 2005, our serologic testing yielded 150 new cases from PVSP, 30 from ASP. The incidence rate in 2005 for PVSP (population approx. 5,000) would be at least 3,000 per 100,000, greater in 2006. Some cases recognized in 2006 likely began in 2005). Some cases are medically managed on site but very ill inmates have had care in non-prison facilities. Estimates of the cost per patient have varied from \$8,000 in the 1990's to \$30,000 more recently. Thus, there are important medical, demographic and financial implications to the State.

INTRODUCTION

For many years, coccidioidomycosis (CM) has been encountered in inmates of prisons in the endemic areas of the Southwestern United States. In recent years, new prisons have been constructed in coccidioidal endemic areas of California and this has resulted in an expanded problem with this disease among inmates and employees; a problem which has attracted our attention.

CM apparently was first recognized in an inmate of Folsom Prison in California in 1919.¹ This prison, near Sacramento was not in the area(s) to which this disease is endemic exemplifying how cases of the disease may be encountered outside the endemic zones. This

also is exemplified by a prisoner in Boise, Idaho whom we have followed serologically for some years after his acquisition of CM in California.

Other instances of CM in incarcerated persons occurred during World War II among Japanese-Americans forced into a camp near Casa Grande, Arizona, and among German prisoners of war in Florence, Arizona.² Among German prisoners of war some complained of mistreatment as a result of lethal and other coccidioidal infections, under the Geneva Convention Rules and this led to discontinuation of the use of the Florence, AZ facility for foreign prisoners; but it has continued to house civilian prisoners. In the 1950's and later, CM was described among young men-prisoners who were sent to fight fires in endemic areas of Los Angeles County and elsewhere.^{3,4}

For many years, our UC Davis Coccidioidomycosis Serology Laboratory has received serum specimens from incarcerated individuals who have or are suspected of having coccidioidomycosis. For example, sera had been submitted by Dr. D. Smilovitz and others from infected inmates in the California Men's Colony in San Luis Obispo County. In the year 2000, our attention was called to an outbreak of CM among inmates of the California Youth Authority, Paso Robles, who had been assigned to fight grass fires in McKittrick in the highly endemic area of Kern County. This led us into compilation of cases from other State Prisons.^{5,6} The occurrence of CM in inmates has important implications—to the State and its citizens: medical, demographic, and financial.

MATERIALS AND METHODS

The cases of coccidioidomycosis were detected by positive serologic tests on serum or other body fluids. Testing was carried out at our UC Davis Coccidioidomycosis Serology Laboratory. Initial testing was carried out by immuno-diffusion of specimens after being concentrated approximately eight-fold by evaporation under reduced pressure.^{7,8} Patients were identified by name, date of birth and inmate (California Department of Corrections) identification

number. In many instances, for logistical reasons, specimens from several inmates were drawn on the same date rather than in relationship to clinical indications. As a result of this, it was not possible to know the date of onset of illness thus usually precluding recording cases by month. Moreover, on some occasions it was evident that sera from some inmates came by way of some intermediate laboratory obscuring the provenance of the specimen. In Figure 1 we have presented a map of California indicating the location of prisons (name underlined) with respect to recognized areas to which CM is endemic. The more detailed map in Figure 2 indicates the relative positions of three prisons significantly represented among the cases we have tabulated: Coalinga (Pleasant Valley State Prison), Avenal, and Corcoran.

RESULTS

Simply expressed are the numbers of cases recognized serologically: Tables 1, 2, 3 and 4. Note that the data of Table 1 were obtained before Pleasant Valley State Prison (PVSP) was completed. Following its inclusion, PVSP became the largest contributor of cases Figure 3 illustrates the influence of "new construction" (including excavation) for a mental health hospital near (perhaps 200 yards from) PVSP. Construction began in late Summer to early Fall and soon the number of case increased. (As noted in Materials and Methods) some cases recorded for a given month ^{were} based on the date of the positive serum, but might ^{have} been drawn in an adjacent month. It was evident that PVSP had a higher rate of infections than other institutions some of which had comparable numbers of inmates. By mid-August 2006, PVSP had 300 new cases recognized, far exceeding those recognized (51) of Avenal, the next highest represented. We calculated incidence of 3,000/100,000 for PVSP in 2005; and in 2006 up to mid-August the rate was 6,000/100,000. For comparison, the highest incidence rate of CM was 572/100,000 for Kern County during the epidemic year 199³. By mid-August, the total reported cases of CM in California were approximately 1,300. Thus, the total cases 388, of state prisons (Table 4) represented approximately 30% of the cases reported to the California State Department of

Health Services. In 2005, the state prison cases (244) represented 15% of the total reported case⁵ (approximately 1,600) in California.

Based on studies in Kern County during the epidemic years of the 1990's, the cost of care per patient was \$8,000.⁹ The 388 patients detected in State Prisons, based on the figure of Caldwell et al would have cost \$3,104,000.00. Others have calculated that the cost per hospitalized patient (in 1998-2001) was approximately \$34,000.¹⁰ Inasmuch as approximately 5 per cent of patients with clinical evidence of coccidioidomycosis undergo metapulmonary dissemination of their disease, of the 388 patients at least 20 would have required hospitalization at a cost of \$780,000. Therefore, the fiscal impact to the State is substantial.

DISCUSSION

Incarcerated individuals and employees of correctional institutions in endemic areas may acquire coccidioidomycosis. Because incarcerated individuals have centralized medical care, some compilation of cases is possible. Enumeration of cases among employees is more difficult because they do not have a unified source for medical care.

Coccidioidal infections can be acquired by inmates within the institutions to which they have been confined, or, as illustrated above, by inmates who have been confined in institutions outside the endemic areas but have been assigned to fight fires in endemic areas.

Occasionally prisoners are transferred from one California State Prison to another. In some instances, an individual already afflicted with coccidioidomycosis may baffle an unsuspecting medical staff owing to the mimicry of coccidioidomycosis for other diseases or because the medical staff does not appreciate that the patient/inmate had previously been in the endemic area. One striking example of this is a male prisoner in an institution in a non-endemic Idaho as cited above who acquired his coccidioidal infection in California.

Drastic consequences followed in a former prisoner who acquired his coccidioidal disease in prison in Arizona but who then moved to Alabama where he became moribund

cerebrovascular episode deemed to be lethal. His physicians in Alabama were not initially aware of his prior coccidioidomycosis, and donated his kidneys and liver to awaiting recipients. At 19 and 17 days after transplantation respectively the recipient of one kidney and the recipient of the liver died with fulminant coccidioidomycosis.¹¹ Owing to the varying severity of coccidioidomycosis, the intensity and strategy in the treatment of inmate/prisoners can pose a challenge to prison physicians and their often-limited resources. As a result there are occasions when the inmate/patient's illness requires more complex management modalities that are available at "outside", non-prison referral hospitals. An example, treatment of spinal coccidioidomycosis, provided valuable information of management of severe coccidioidomycosis.¹²

An additional problem pertains to patient/inmates who acquire coccidioidomycosis and are subsequently discharged after they have completed their sentence. Uncertainty about their clinical status and about how and where to seek medical attention may result in or be followed by recrudescence of coccidioidal disease. At least one such individual died following his belated lower case channeling into a medical care center.

One aspect of coccidioidomycosis that could be defined is the influence of certain intercurrent diseases present among inmates (e.g. hepatitis C) on the course of coccidioidomycosis. Additional valuable information may also accrue from the medical and surgical attention provide to inmates as mentioned above relative to spinal surgery.¹²

Some cases of CM can be anthropogenic, as in the construction of a mental health facility adjacent to Pleasant Valley State Prison, or can result form the expected seasonal/climatic associations which influence the rise and fall of incidence. However, the incarceration of individuals from non-endemic areas, in Federal¹³ as well as State prisons within the endemic areas will continue to provide a stream of challenging and costly cases of coccidioidomycosis.

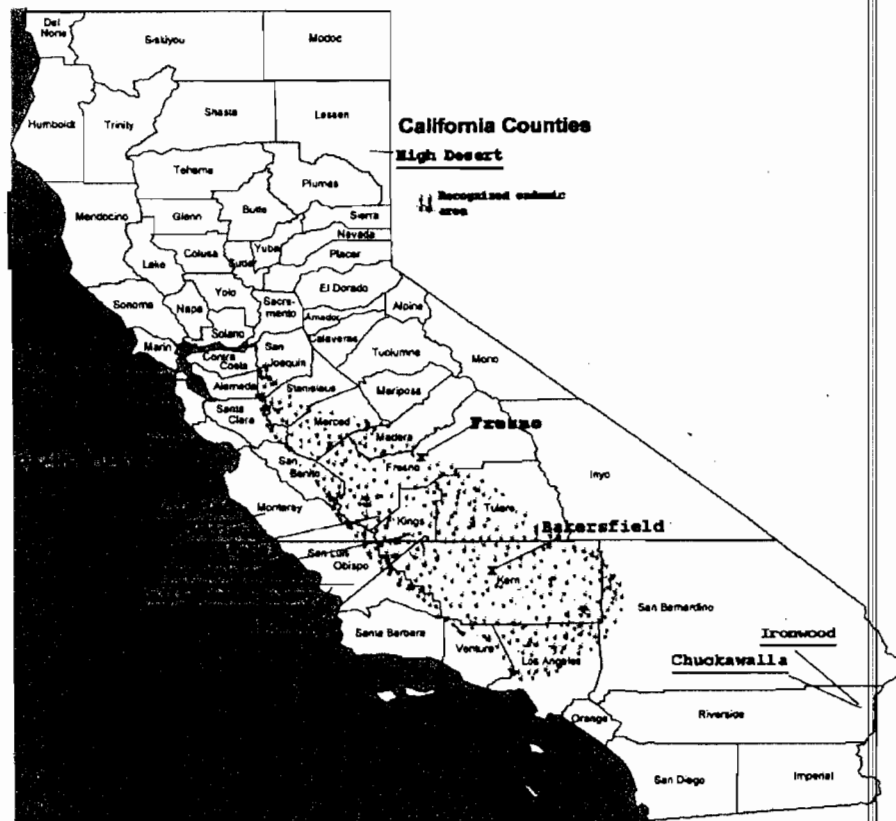
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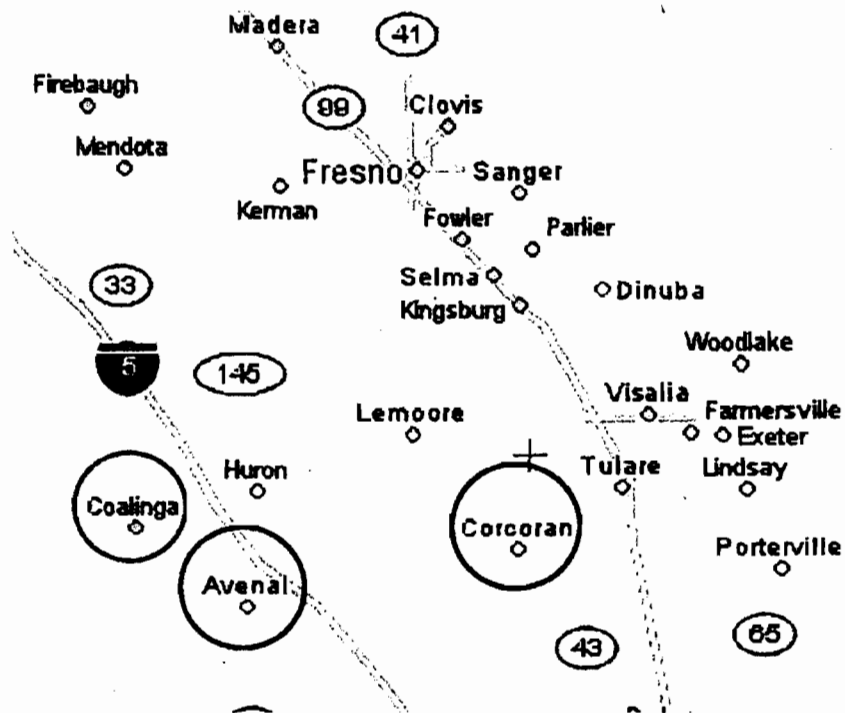
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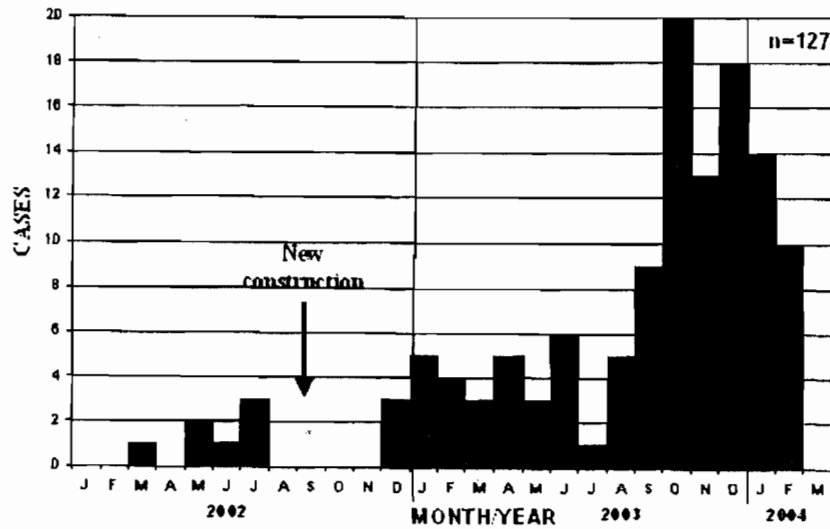
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Map of California and recognized endemic area with prison locations (names underlined).

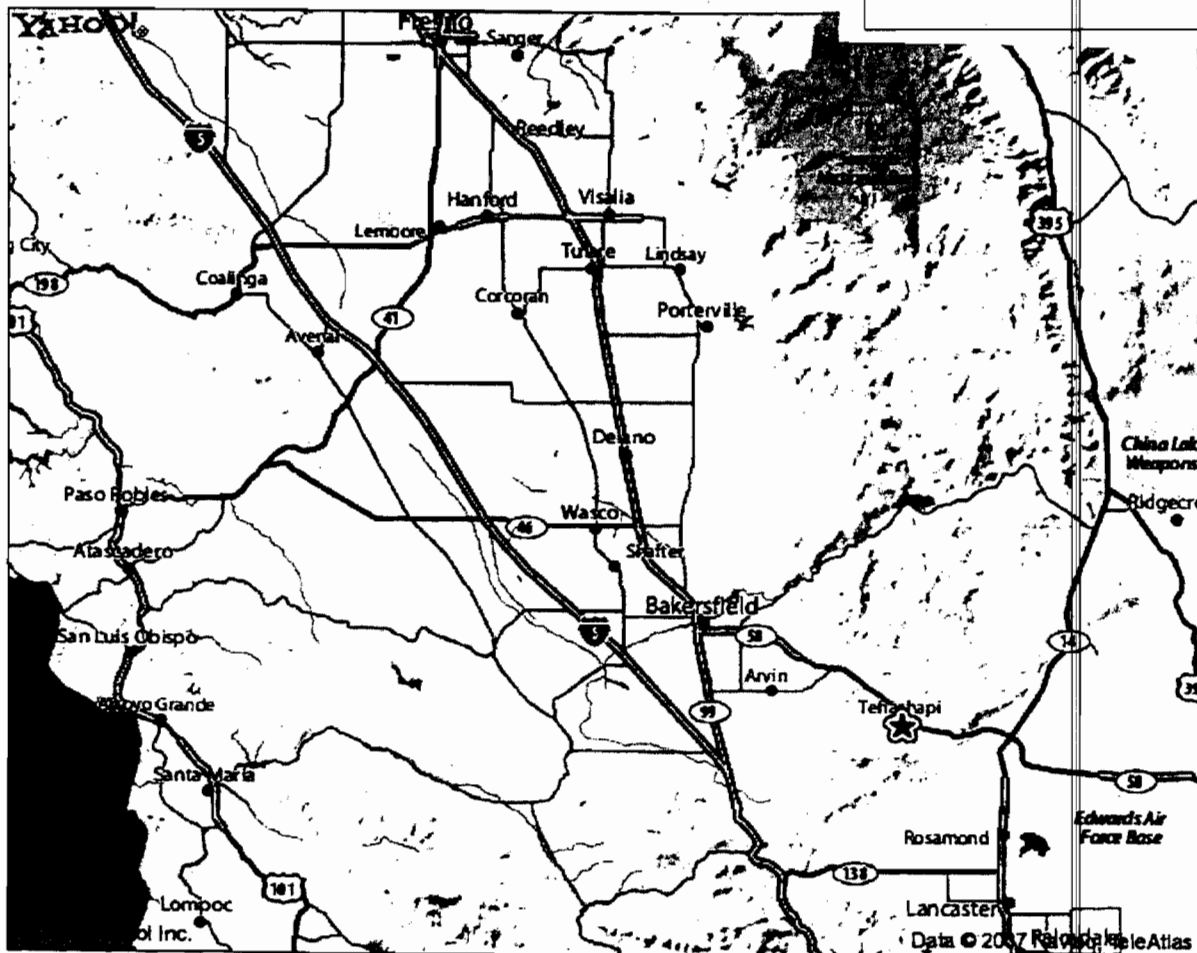
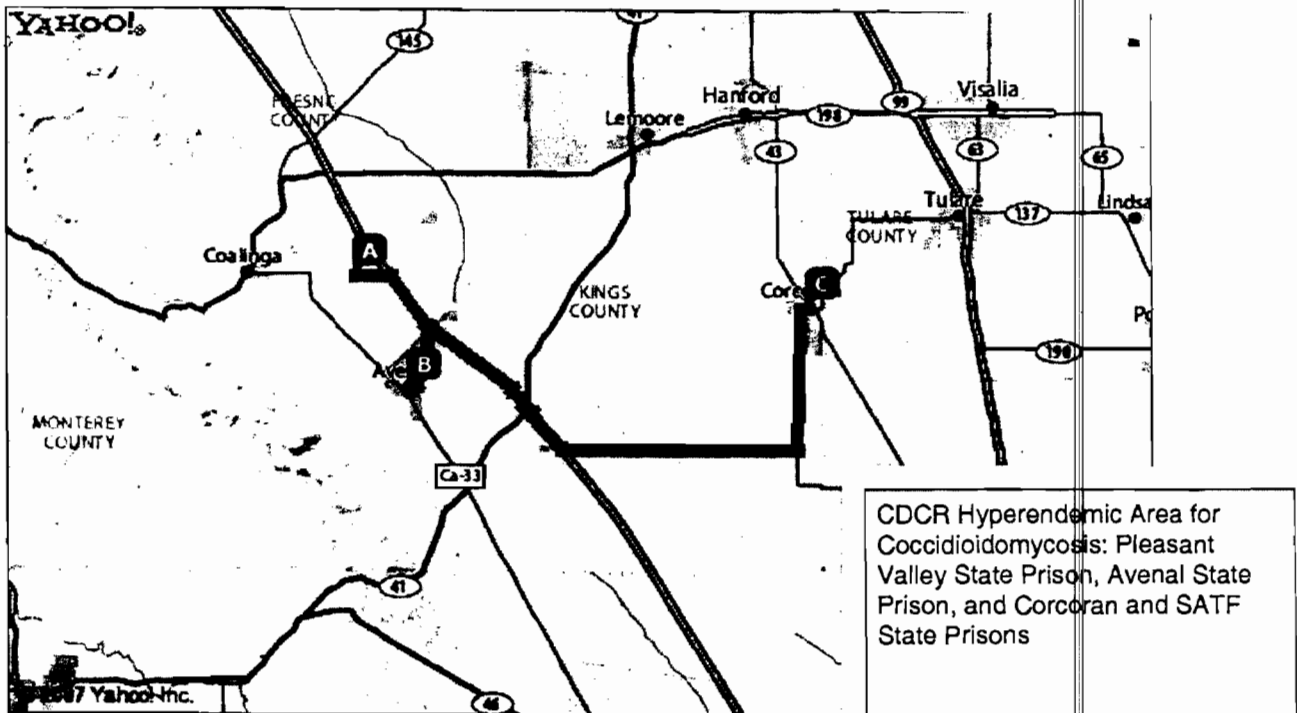


Three State prisons in the western San Joaquin Valley.



Cases of CM at Pleasant Valley State Prison between January 2002 and March 2004.
Approximate time of construction of a mental health hospital near the prison is designated with an arrow.

CA DEPARTMENT OF CORRECTIONS AND REHABILITATION
HYPERENDEMIC AREA
FOR
COCCIDIOIDOMYCOSIS



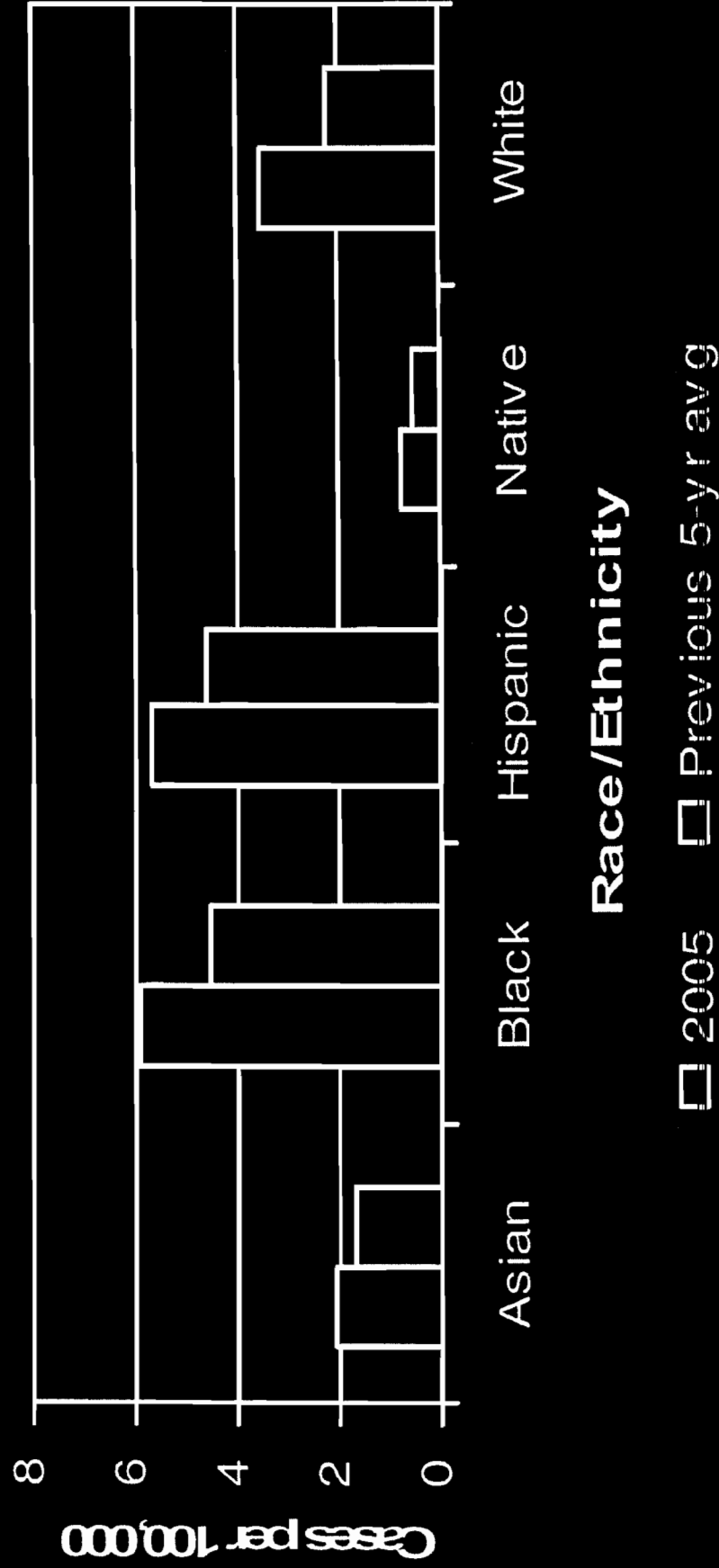
Risk Factors for Coccioidomycosis

- Region
- Weather
- Soil disturbance
- Lack of prior exposure
- For disseminated disease:
 - Immunosuppression and/or some chronic diseases
 - Male gender (and females in late pregnancy)
 - Race (e.g., Black, Filipino)



COCCIDIOIDOMYCOSIS

Rates by Race/Ethnicity, California, 2005 and Previous 5-year Average



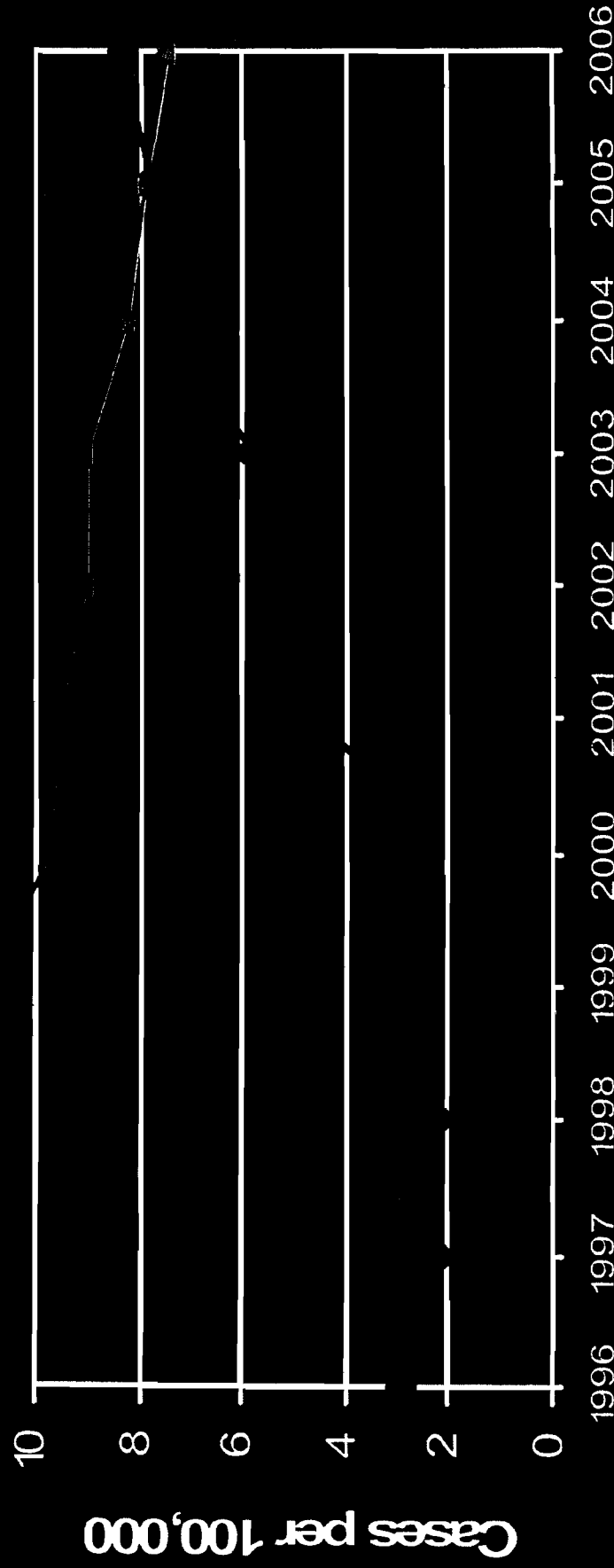
45.9% of 2005 and 38.2% of 2000–2004 cases reported without race/ethnic detail do not contribute to this graph.



Count of Coccidioidomycosis Cases by Estimated Year of Onset



and California, 1996 - 2006

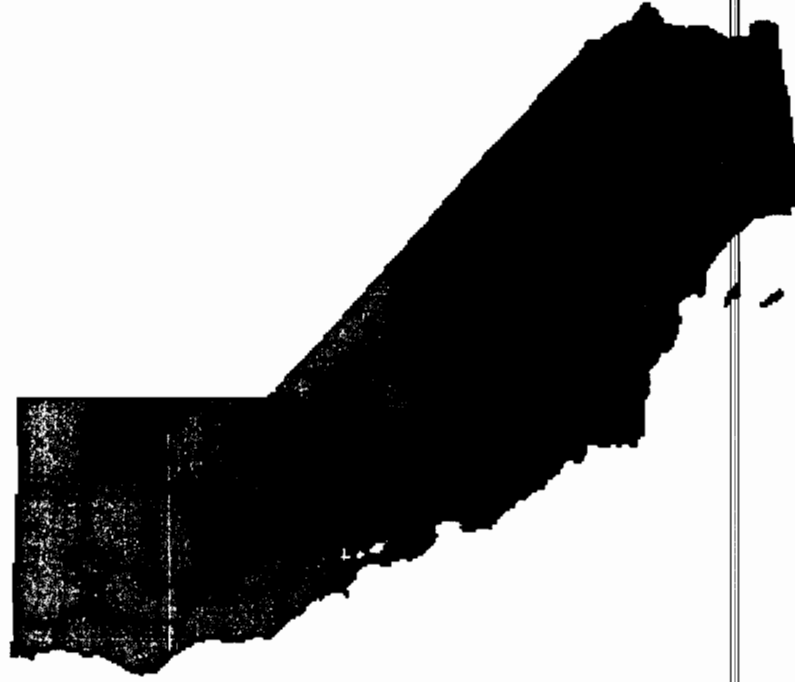


Year of Report

Rate by Local Health Jurisdiction ranges from 0 to 223 (Kern County, 2005).



Coccidioidomycosis by County California, 2006



County Rates
(cases per 100,000)

No Cases Reported
Between 0 and 5
Between 5 and 25
Above 25

