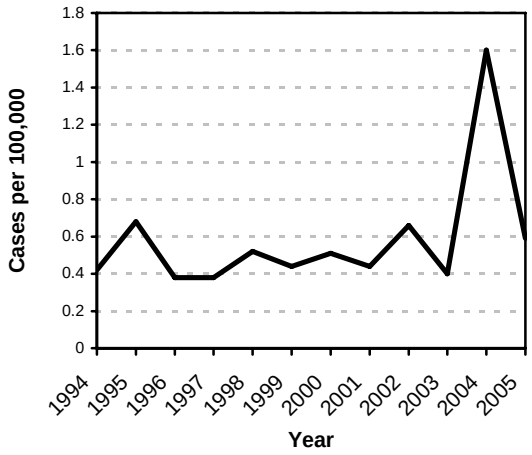
ENCEPHALITIS

CRUDE DATA	
Number of Cases	56
Annual Incidence[a,b]	
LA County	0.59
California	N/A
United States	N/A
Age at Diagnosis	
Mean	25
Median	15
Range	0-93 years
Case Fatality	
LA County[b]	9%
United States	N/A

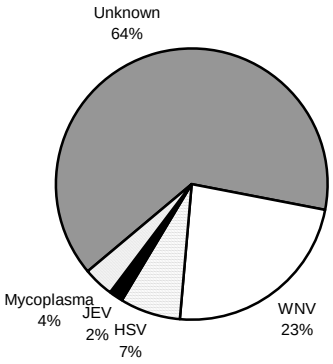
Figure 1
Encephalitis
Incidence Rates by Year of Onset
LAC 1994–2005



[a] Cases per 100,000 population 2005 LAC Census estimates.
[b] Excludes AIDS encephalopathy cases.

DESCRIPTION

Figure 2.
Encephalitis by Etiology
LAC, 2005 (N=36)



Encephalitis, an inflammation of parts of the brain, spinal cord and meninges, causes headache, stiff neck, fever and altered mental status. It can result from infection with a number of different agents including viral, parasitic, fungal, rickettsial, bacterial and chemical. Public health surveillance is limited to cases of suspected or confirmed viral etiology, which includes primary and post-infectious encephalitis—but excludes individuals with underlying Human Immunodeficiency Virus (HIV) infection. Of special concern is arboviral (mosquito-borne) encephalitis, which can be prevented by personal protection and mosquito control (See WNV section). Arthropod-borne viruses, i.e., arboviruses, are viruses that are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, ticks, and certain mites and gnats). All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman vertebrate primary host and a primary arthropod vector. Arboviral encephalitides have a global distribution. There are five main viral agents of encephalitis in the United States: West Nile virus (WNV), eastern equine encephalitis (EEE), western equine encephalitis (WEE), St. Louis encephalitis (SLE) and La Crosse (LAC) encephalitis, all of which are transmitted by mosquitoes.

DISEASE ABSTRACT

- In 2005, 56 encephalitis cases were reported. The underlying etiologies of encephalitis were identified in 20 (36%) cases and included: 13 (65%) with WNV (see WNV Report for details), 4 (20%) herpes simplex virus (HSV), 2 (10%) *Mycoplasma pneumoniae* and 1 (5%) case with Japanese encephalitis (Figure 2).
- The incidence of viral encephalitis decreased in 2005, 0.59 cases per 100,000 population, compared to 1.4 cases per 100,000 population documented in 2004 (Figure 1).
- The case fatality, 9% (n=5), in 2005 was slightly higher than the prior year, 7% in 2004.
- The majority of encephalitis cases occurred in children ages 5-14 years, 18 (32%); 11(19%) occurred in those 15-64 years of age and 7 (12%) were in adults more than 65 years of age.
- Hispanics had the greatest number of encephalitis cases, 27 (47%), followed by Whites, 14 (25%), Blacks, 5 (9%), Asians, 11 (19%).
- The number of reported encephalitis case was highest in SPA 2 (n=15, 0.7per 100,000), followed by SPA 7 & 8 (n=10, 0.9, 0.7 per 100,000), and SPA 4 (n=6, 0.5 per 100,000).

The reported annual incidence of acute encephalitis reported in the medical literature varies from 3.5-7.4 cases per 100,000 person-years. In 2005, the overall Los Angeles County viral encephalitis rate of 0.59 per 100,000 person-years was far lower than the 2004 incidence rate (1.4 cases per 100,000) and rates quoted in surveillance literature. Reasons to explain the lower rate could be due far fewer cases of WNV-associated encephalitis reported in 2005 compared to 2004 and the exclusion of other infectious etiologies (such as bacterial, fungal, protozoal, HIV-related) from our encephalitis surveillance data; misclassification of encephalitis cases as meningitis; and underreporting of hospitalized encephalitis cases, since all reporting is passive. The case fatality from encephalitis has ranged from a high of 38 % in 1997 to a low of 9% in 2005 and remains lower than the 2005 overall case fatality rate from the California Encephalitis Project, reported as 12% in 2005. The higher encephalitis mortality rate reported by the California Encephalitis Project, a California Department of Health Services' research project, may be biased to include more severely ill individuals are more likely included in this data source.

Of particular public health concern in LAC are the arthropod-borne viral (arboviral) encephalitides, SLE, WEE and WNV viruses endemic to California. Since 1985, sporadic cases of SLE have been reported each year following an outbreak of 16 cases in 1984. The last confirmed SLE case in LAC was in 1997. The potential for another SLE outbreak exists, as sporadic cases in previous years and identification of SLE in sentinel chicken populations indicate that the virus remains endemic in LAC. Beginning in 2001, arboviral disease surveillance has included WNV, in addition to SLE and WEE.

In 2005, 13 reported encephalitis cases had laboratory-confirmed WNV thought to be locally acquired. Like SLE virus, WNV is transmitted principally by *Culex* species mosquitoes. Enhanced surveillance for early detection of virus activity in birds and mosquitoes will be crucial to guide control measures in 2006. It is expected that WNV will remain endemic in LAC and will spread through most of CA in 2006.

Japanese encephalitis (JE) is a mosquito-borne flavivirus antigenically related to WNV and SLE. It is the leading cause of viral encephalitis in Asia with 30-50,000 cases reported annually and is vaccine preventable. Fewer than one case per year is confirmed in the U.S. In July 2005, one case of JE was reported to LAC. Acute and convalescent serological titers confirming this diagnosis were completed at the Centers for Disease Control and Prevention arboviral diagnostic laboratory. The case was an elderly California Filipino resident who had traveled to the Philippines, and became ill upon return to CA and subsequently recovered.

Prevention measures for arboviral infections consist of personal protection, screened on windows, avoiding mosquito-infested areas, especially at dusk when most mosquitoes are active, wearing protective clothing and use of insect repellants containing DEET, oil of eucalyptus and Picaridin. Elimination of standing water and proper maintenance of ponds and swimming pools decrease the available sites for hatching and maturation of mosquito larvae. Five local mosquito abatement districts monitor and control populations of these insects, especially in areas used by the public (See WNV section).

Future Directions: Surveillance for WNV infection in humans, mosquitoes, sentinel chickens, and dead birds will continue throughout the state of CA. and LAC. Research is underway to develop a WNV vaccine and treatment for humans. No human vaccine is available for SLE, WEE, and WNV. A human vaccine exists for JE.

Licensed equine (horse) vaccines are available for WEE, EEE, and WN viruses.

ADDITIONAL RESOURCES

Glaser CA, Gilliam S, Schnurr D, Bagher F, Honarmand S, et al. In search of encephalitis etiologies: Diagnostic challenges in the California Encephalitis Project, 1998–2000. CID 2003; 36:731–42.

Khetsuriani H, Holman RC, Anderson LJ. Burden of encephalitis-associated hospitalizations in the United States, 1988–1997. CID 2002; 25:175–82.

Johnston RT. Acute Encephalitis. CID 1996; 23:219–26.

Nicolosi A, Hauser WA, Beghi E, Kurland LT. Epidemiology of central nervous system infections in Olmsted County, Minnesota, 1950–1981. J Inf Ds 1986; 154:399–498.

Trevejo RT. Acute Encephalitis Hospitalizations, California, 1990-1999: Unrecognized arboviral encephalitis? Emerging Inf Dis 2004; 10:8: 1442-1449.

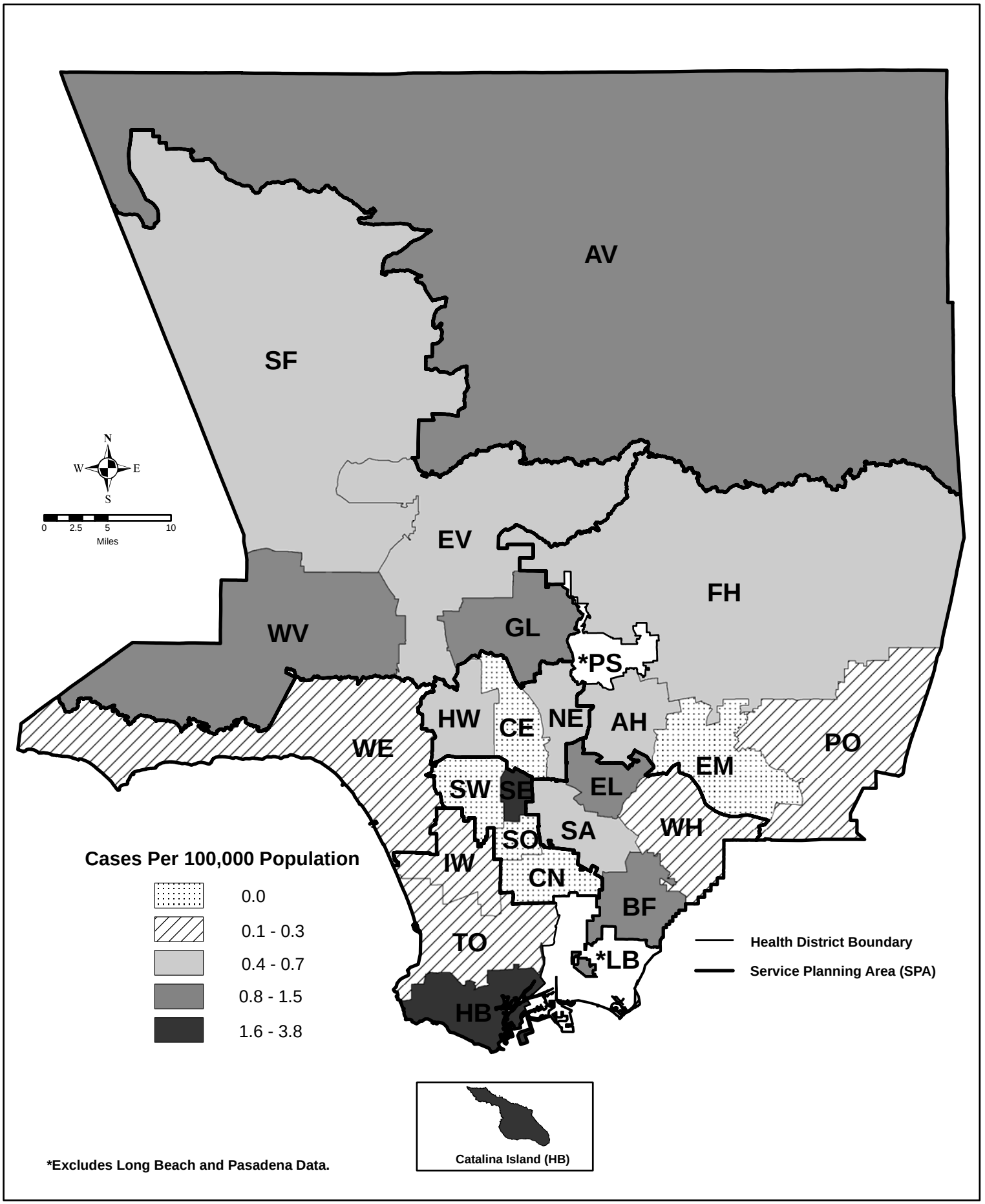
For information on mosquito-borne encephalitis: www.cdc.gov/ncidod/dvbid/arbor/index.htm

For information for consumers: www.nlm.nih.gov/medlineplus/encephalitis.html

For more detailed information such as causal information and effective management strategies: www.postgradmed.com/issues/1998/03_98/guti.htm

Information about case investigation of encephalitis in LAC is available at: www.lapublichealth.org/acd/procs/b73/b73index.htm

Map 5. Encephalitis
Rates by Health District, Los Angeles County, 2005*



*Excludes Long Beach and Pasadena Data.