LYME disease SURVEILLANCE SUMMARY

Bacterial Zoonoses Branch
Division of Vector-Borne Infectious Diseases
National Center for Infectious Diseases
Centers for Disease Control

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THE SURVEILLANCE OF LYME DISEASE IN CALIFORNIA

Lyme disease (Ld) was made a reportable condition in California, March 1989. In 1989 and 1990, the case definition for Ld was met by a person having: 1) Erythema migrans (EM) with exposure that occurred no more than 30 days prior to onset of EM in an area where *Ixodes pacificus* is known to exist; or, (2) in the absence of EM, involvement of at least 1 of the 3 organ systems commonly affected with Ld (cardiac, neurologic, or musculoskeletal) and a positive serologic test for *Borrelia burgdorferi*.

During 1989 (a partial reporting year), 250 reported cases met this case definition. In 1990, 345 cases were counted; 16 of these cases were considered to have been contracted out of state and the county of possible exposure could not be ascertained for 3 cases. Of the 326 other cases with in-state exposure, 299 (92%) were probably contracted by or, at least, diagnosed in northern California residents; the other 8% of cases were in southern California residents. Ages ranged from 2 to 90 years; the median ages for males and females were 41 and 40 years, respectively. Female cases outnumbered males by a ratio of 1.46:1. Of the 168 cases with EM, 102 (61%) had onsets in the months of April through September.

The occurrence of *B. burgdorferi*, its tick vector, and Ld in humans is well documented in California. The vector tick, *I. pacificus* (commonly called the western black-legged tick) is found in 53 of the 58 counties in the state--everywhere except dry, arid areas (see map). The counties without documentation of *I. pacificus* to date are Alpine, Kings, Modoc, Mono, and San Joaquin Counties. *B. burgdorferi* has been isolated from *I. pacificus* ticks in 35 counties (see map). Until recently, infected ticks were found only in northern and central California counties where the mean infection rate in ticks is 1-2%, with some localized geographic areas having up to a 6% infection rate (compared with tick infection rates of 30% to 60% in northeastern Atlantic coastal states). In the spring of 1991, *B. burgdorferi* was isolated from tick pools collected in Kern, San Bernardino and Orange Counties. In addition, *B. burgdorferi* has been isolated from several Ld patients in northern California.

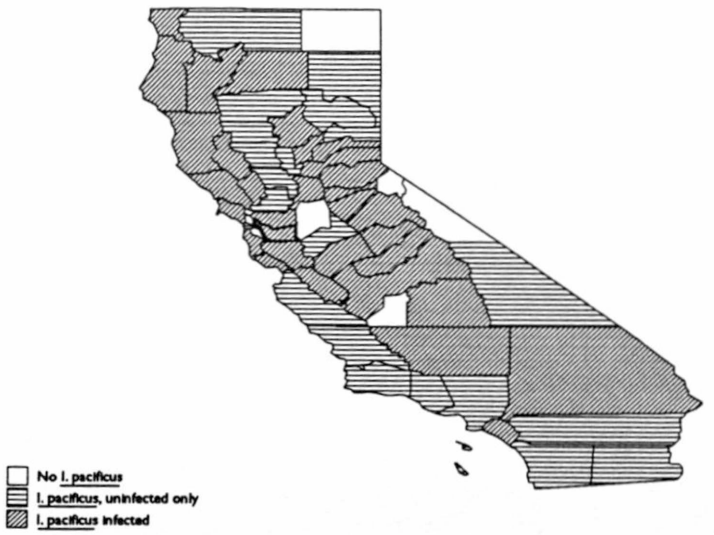
Prior to 1989, the only Ld surveillance data available in California came from non-population-based reporting of suspected cases for whom serologic tests were performed by the Centers for Disease Control (CDC). Specimens for testing were forwarded to CDC along with a completed case history form. Analysis of data submitted with these specimens showed that, of 1,845 suspected cases during the 5-year period, 1983-

1987, 399(22%) met the same case definition used in 1989-1990 and were judged to have been acquired in California. Cases were contracted in 37 counties in widely scattered areas of the state, but 72% were judged to have been acquired in the 4 contiguous northwestern coastal counties of Marin, Sonoma, Mendocino, and Humboldt. Moreover, 59% of the cases were thought to have been acquired in Humboldt and Mendocino Counties alone. In 1990, however, only 43% of the 326 California acquired cases were considered to have been contracted in Marin, Sonoma, Mendocino, and Humboldt Counties compared to 72% of the cases in 1983-1987, and only 19% were contracted in Humboldt and Mendocino Counties compared with 59% in the earlier time period. These disparate data and the results of an informal survey of physicians in northwestern California that showed many more cases of Ld diagnosed than were reported in 1989, suggested that surveillance and reporting practices for Ld should be carefully examined in California. A study to conduct an active surveillance program for Ld in Lake, Mendocino, Sonoma, and Humboldt Counties was funded by CDC to gain a better estimation of the true incidence of the disease in areas of the state considered hyperendemic. This program involves collaboration among county health departments, the California Department of Health Services, the University of California at Berkeley, and CDC. The program will also recruit patients with incident Ld (physician-diagnosed EM) for a companion case-control study of risk factors for Ld in California and attempt to evaluate the effect on reporting practices of a newly adopted national surveillance case definition.

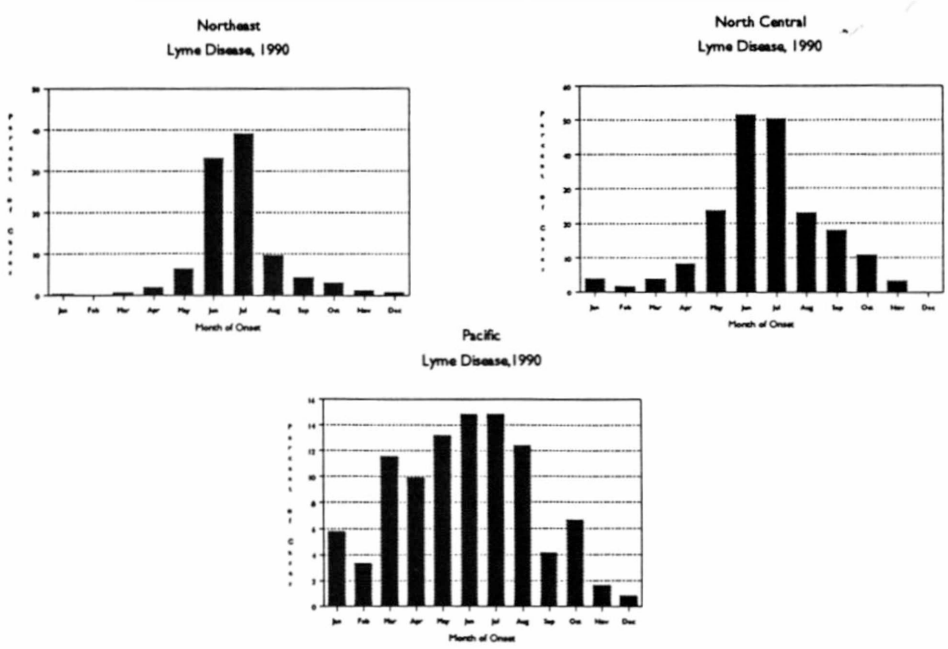
[Adapted from California Mortality (#47, Nov. 1991) with permission of the author, Dr. Robert Murray, State Epidemiologist, California Department of Health Services.]

EDITORIAL NOTE: The occurrence of *I. pacificus* in 53 of 58 California counties indicates the considerable habitat diversity of this vector; however, as in other endemic states, Lyme disease transmission is unevenly distributed, with more than 90% of reported cases contracted in northern counties in 1990. Results of active and passive surveillance in 1991 yielded an incidence estimate of 13.1 cases per 100,000 for the most highly endemic counties in northern California (personal communication, C. Ley, Univ of CA, Berkeley). Of the 168 cases reported with EM onset in 1990 in California, 61% had onsets in the months of April through September--the seasonality of Lyme disease in Pacific coast states is less marked than that noted in endemic regions of Northeast and North-Central U.S. (see graph). The differences may be due to a greater year-round activity of infective ticks and/or greater year-round outdoor exposure of residents in the West, where the climate is mostly temperate throughout the year.

California counties* with Infected and Uninfected *I.pacificus*



*Information provided by the Environmental Management Branch, California Department of Health Services. Distribution of ticks within counties may be quite focal.



COOPERATIVE AGREEMENTS FOR LYME DISEASE EDUCATION

Cooperative Agreements for Lyme disease are funded by a Congressional appropriation which mandated funding for educational projects. Twenty-five percent of the $2.7 million in Cooperative Agreement funds for FY 1992 have been awarded for education. Projects and awardees funded through May 1992 are listed below. Project oversight for these agreements is provided by DVBID personnel from various Branches.

Current Projects

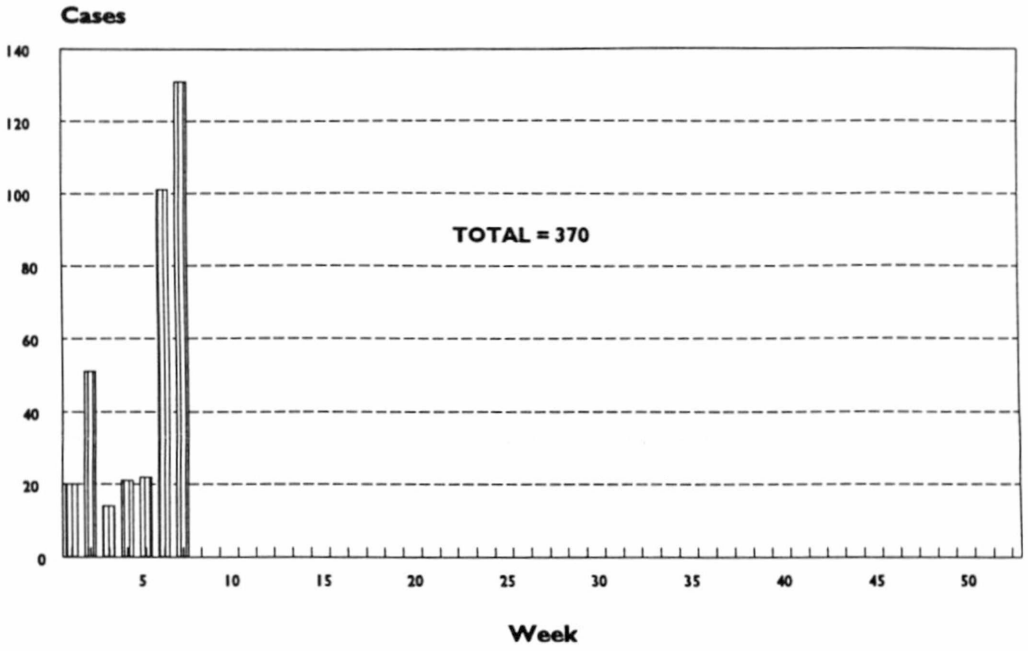
- Lyme Disease Education in California. Robert Lane. University of California at Berkeley
- Lyme Disease Prevention Films. Robert Weld. American Lyme Disease Foundation. Rye Brook, NY
- Lyme Disease Education in Connecticut. Matthew Cartter. Connecticut State Health Department. Hartford, CT
- Lyme Disease Education in Wisconsin. Barry Sullivan. Marshfield Clinic. Marshfield, WI
- Lyme Disease Education in Pennsylvania. K. C. Kim. Pennsylvania State University. State College, PA
- Education about Lyme Disease Prevention. Genie Wilmarth. Connecticut Arthritis Foundation, Rocky Hill, CT
- Bilingual and Sign Language Educational Materials for Lyme Disease. Karen Forschner. Lyme Borreliosis Foundation. Tolland, CT
- Educational Conference on Lyme Disease. Karen Forschner. Lyme Borreliosis Foundation. Tolland, CT

REPORTING OF LYME DISEASE CASES IN 1992 BY NETSS

The numbers of Lyme disease cases reported through NETSS in the period January through February 15 are shown in Figure 1. Of the total 370 cases reported through Week 7, 299 (81%) were reported from the mid-Atlantic and New England regions.

FIGURE 1

REPORTED LYME DISEASE CASES, U.S., 1992



PRELIMINARY DATA FOR CASES OF LYME DISEASE REPORTED IN 1991

A total of 9,344 cases of Lyme disease was reported by State Health Departments to CDC for 1991. The data are presented by state, and federal geographic region, and compared to final reported case numbers for 1982 through 1990 (see Table). Cases in 1991 increased by 17% over 1990 and by 6% over the previous high year, 1989. Regional increases in totals were noted in the New England, mid-Atlantic, West North Central, and East South Central Regions. Three states--Hawaii, New Mexico, and Montana--reported no cases in 1991. Alaska reported 1 imported case in 1991. Since Lyme disease reporting began in 1982, more than 40,000 cases have been reported in the United States. Lyme disease accounted for 81% of all reported cases of vector borne infections from 1986-1990.

Lyme Disease Surveillance Spreadsheet

STATE	REG	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	TOTAL [1]	1990 pop	Inc_91 [2]
ALABAMA	ESC	0	0	0	0	1	1	1	25	33	18	79	4165000	0.432
ALASKA	PAC	0	0	0	0	0	0	0	0	0	1	1	525000	0.190
ARIZONA	MT	0	0	0	0	0	0	0	0	0	1	1	3666000	0.027
ARKANSAS	WSC	0	1	4	0	0	0	16	10	22	29	82	2421000	1.197
CALIFORNIA	PAC	0	11	24	70	107	182	200	250	345	323	1512	29287000	1.102
COLORADO	MT	0	0	0	0	0	0	2	1	0	1	4	3331000	0.030
CONNECTICUT	NE	135	73	483	699	0	215	362	774	704	1221	4666	3266000	37.38
DELAWARE	SA	1	4	1	0	0	6	4	25	54	72	167	682000	10.55
DC	SA	0	0	0	0	0	0	0	0	5	5	10	603000	0.829
FLORIDA	SA	0	0	0	2	0	1	0	6	7	23	39	12942000	0.177
GEORGIA	SA	0	0	1	1	2	4	53	715	161	31	968	6598000	0.469
HAWAII	PAC	0	0	0	0	0	0	0	1	2	0	3	1133000	0
IDAHO	MT	0	0	0	0	0	0	1	42	1	2	46	1013000	0.197
ILLINOIS	ENC	0	0	0	2	0	6	5	79	30	25	147	11682000	0.214
INDIANA	ENC	0	0	1	0	1	3	0	8	15	13	41	5617000	0.231
IOWA	WNC	0	0	0	1	1	4	15	27	16	22	86	2814000	0.781
KANSAS	WNC	0	0	0	0	0	1	0	15	14	22	52	2522000	0.872
KENTUCKY	ESC	0	0	0	0	0	3	5	21	18	43	90	3745000	1.148
LOUISIANA	WSC	0	0	0	0	0	0	2	2	3	6	13	4368000	0.137
MAINE	NE	0	0	0	1	4	0	1	3	9	9	27	1236000	0.728
MARYLAND	SA	7	4	11	20	15	27	66	138	238	274	800	4774000	5.739
MASSACHUSETTS	NE	15	13	33	69	163	95	80	129	117	290	1004	5921000	4.897
MICHIGAN	ENC	0	1	0	1	0	4	21	165	134	110	436	9292000	1.183
MINNESOTA	WNC	22	55	86	64	94	94	67	92	70	85	729	4377000	1.941
MISSISSIPPI	ESC	0	0	0	0	0	0	6	7	7		20	2649000	
MISSOURI	WNC	0	0	2	1	1	4	5	108	205	193	519	5207000	3.706
MONTANA	MT	0	0	0	0	0	0	0	0	0	0	0	797000	0
NEBRASKA	WNC	0	0	0	0	0	0	0	0	0	20	20	1604000	1.246
NEVADA	MT	0	0	0	0	0	0	0	7	2	7	16	1130000	0.619
NEW HAMPSHIRE	NE	0	1	0	0	7	0	8	3	4	35	58	1140000	3.070
NEW JERSEY	MA	57	70	155	175	219	257	500	680	1074	852	4039	7808000	10.91
NEW MEXICO	MT	0	0	0	0	0	0	0	5	0	0	5	1539000	0
NEW YORK	MA	170	267	466	1235	482	877	2637	3224	3244	3357	15959	17868000	18.78
NORTH CAROLINA	SA	0	1	16	14	6	2	19	61	87	81	287	6688000	1.211
NORTH DAKOTA	WNC	0	0	0	0	0	0	1	12	3	2	18	658000	0.303
OHIO	ENC	0	0	3	2	2	14	39	99	36	173	368	10907000	1.586
OKLAHOMA	WSC	0	0	0	0	2	2	4	16	13	31	68	3190000	0.971
OREGON	PAC	0	1	10	5	10	19	4	5	11	5	70	2822000	0.177
PENNSYLVANIA	MA	2	0	5	29	31	65	306	626	553	1022	2639	12043000	8.486
RHODE ISLAND	NE	29	20	20	41	57	74	121	415	101	177	1055	998000	17.73
SOUTH CAROLINA	SA	0	0	1	3	3	3	10	18	7	10	55	3560000	0.280
SOUTH DAKOTA	WNC	0	0	0	0	0	2	2	3	2	1	10	716000	0.139
TENNESSEE	ESC	0	1	1	4	1	1	13	30	28	45	124	5009000	0.898
TEXAS	WSC	0	1	18	172	8	33	18	82	44	15	391	17053000	0.087
UTAH	MT	1	1	0	0	1	0	2	3	1	3	12	1729000	0.173
VERMONT	NE	0	0	0	0	0	0	1	1	11	7	20	571000	1.225
VIRGINIA	SA	0	0	1	2	7	27	25	54	129	202	447	6229000	3.242
WASHINGTON	PAC	0	0	0	0	0	8	9	33	30	3	83	4797000	0.062
WEST VIRGINIA	SA	0	0	0	0	0	0	5	15	11	44	75	1842000	2.388
WISCONSIN	ENC	58	69	176	135	162	358	246	762	337	424	2727	4892000	8.667
WYOMING	MT	0	0	0	0	0	0	0	6	5	9	20	468000	1.923
U.S. TOTAL		497	594	1518	2748	1387	2392	4882	8803	7943	9344	40108	249894000	3.739
NE SUBTOTAL	NE	179	107	536	810	231	384	573	1325	946	1739	6830	13132000	13.24
MA SUBTOTAL	MA	229	337	626	1439	732	1199	3443	4530	4871	5231	22637	37719000	13.86
ENC SUBTOTAL	ENC	58	70	180	140	165	385	311	1113	552	745	3719	42390000	1.757
WNC SUBTOTAL	WNC	22	55	88	66	96	105	90	257	310	345	1434	17898000	1.927
PAC SUBTOTAL	PAC	0	12	34	75	117	209	213	289	388	332	1669	38564000	0.860
SA SUBTOTAL	SA	8	9	31	42	33	70	182	1032	699	742	2848	43918000	1.689
WSC SUBTOTAL	WSC	0	2	22	172	10	35	40	110	82	81	554	27032000	0.299
ESC SUBTOTAL	ESC	0	1	1	4	2	5	25	83	86	106	313	15568000	0.680
MT SUBTOTAL	MT	1	1	0	0	1	0	5	64	9	23	100	13673000	0.168

Case totals as reported to CDC by state health departments

CDC/NCID/DVBID/BZB

1. Total reported cases, 1982-1991 (Preliminary data for 1991)
2. Incidence per 100,000 population, 1991

POSTDOCTORAL POSITIONS AVAILABLE AT CDC DIVISION OF VECTOR-BORNE INFECTIOUS DISEASES--FORT COLLINS, CO

The Division of Vector-Borne Infectious Diseases has postdoctoral positions available funded through the National Research Council. Potential applicants with interests related to pathogenesis, immunology, and molecular biology of *Borrelia burgdorferi* infections are encouraged to apply. For more information, contact Leonard W. Mayer, Ph.D.,DVBID, POB 2087, Fort Collins, CO, 80522; phone (303)221-6479; FAX (303)221-6476; internet: LWMAYER@ lamar.colostate.edu. The deadline for applications is August 15.

Lyme Disease Surveillance Summary (LDSS) is edited by Drs. Robert Craven and David Dennis. If you have information to contribute or wish to receive a LDSS, please contact them at:

ES

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