C.D.C.

LYME disease SURVEILLANCE SUMMARY

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

Volume 4 – : No. 3
Date: June 1993

LYME DISEASE SURVEILLANCE – UNITED STATES, 1991-1992

Surveillance for Lyme disease (LD) was initiated by CDC in 1982 (1), and in 1990, the Council of State and Territorial Epidemiologists (CSTE) approved a resolution making LD nationally reportable. During 1982-1991, states reported 40,195 cases of LD. In 1992, LD accounted for more than 90% of all reported vector-borne illnesses in the United States (CDC, unpublished, 1993). This report summarizes surveillance for LD in the United States during 1991-1992.

Forty-nine states and the District of Columbia require reporting of LD. The CSTE/CDC surveillance case definition requires the presence of an erythema migrans rash or at least one objective sign of musculoskeletal, neurologic, or cardiovascular disease and laboratory confirmation of infection (2).

During 1991, 47 states reported 9465 cases of LD to CDC (3); during 1992, 45 states reported a provisional total of 9677 cases, representing a 19-fold increase over the 497 cases reported by 11 states in 1982 (1) (Figure 1). Most cases were reported from the northeastern, mid-Atlantic, north central, and Pacific coastal regions (Figure 2). Established enzootic cycles of *Borrelia burgdorferi*, the causative agent of LD, have been identified in 19 states; these states accounted for 94% of cases reported during 1991-1992.

The overall incidence rate of reported LD during 1992 was 3.9 per 100,000 population. During 1992, Connecticut (53.6 cases per 100,000), Wisconsin (10.7), and California (0.8) reported the highest rates in the northeast, north central, and Pacific coastal regions, respectively. Rates in some counties in California, Connecticut, Massachusetts, New York, and Wisconsin exceeded 200 cases per 100,000; the incidence was highest in Nantucket County, Massachusetts (449.1). The number of reported cases in Connecticut and Rhode Island increased 48% and 93%, respectively, over 1991. New York reported a provisional total of 3370 confirmed cases during 1992, a decrease of 574 cases from 1991. From 1991 through 1992, decreases were greatest in Westchester (1762, compared with 1154) and Suffolk (860, compared with 654) counties. In 1992, these two counties accounted for 19% of the national total, compared with 28% in 1991.

Among 7507 cases analyzed for which patient age was given, the largest numbers were reported for persons aged 0-9 years (1087 [14.5%]), 30-39 years (1272 [16.9%]), and 40-49 years (1271 [16.9%]). Of 7642 cases, 3770 (49.3%) occurred among males.

The distribution of LD in the United States is highly correlated with the distribution of the principal tick vectors *Ixodes dammini* (reported to be the same species as *I. scapularis*, the black-legged tick [4]) in the northeastern and north central regions and *I. pacificus* (i.e., the western black-legged tick) in the Pacific coastal states (5). The occurrence of sporadic cases in states without established enzootic transmission of *B. burgdorferi* may be due to infectious exposures in limited, unrecognized foci, exposures during visits to areas with endemic LD outside the state of residence, misclassification, or misdiagnosis. Enzootic foci are highly localized and are dependent on environmental factors favorable to vector ticks and their maintenance hosts (especially deer) and to rodent reservoirs of *B. burgdorferi*. Therefore, subtle ecologic differences may account for substantial differences in incidence between states, counties within states, and adjacent townships (6,7).

The 19-fold increase in reported LD cases since 1982 may reflect a combination of at least four factors: heightened awareness of LD by patients and physicians; increased use of laboratory testing in LD diagnosis; increased surveillance and health department requirements for reporting; and a true increase in the number of cases. Surveillance practices in particular have had an important impact on the reported occurrence of LD. For example, active physician-based surveillance conducted in 1992 by state health departments in collaboration with CDC in Connecticut and Rhode Island resulted in substantial increases in reported cases over 1991. By contrast, the decrease in reported cases in Suffolk and Westchester counties, New York, probably reflects reductions in state and county surveillance personnel necessary to maintain previous levels of case detection and validation.

LD is considered an emerging infectious disease because of the impact of changing environmental and socioeconomic factors, such as the transformation of farmland into suburban woodlots that are favorable for deer and deer ticks (8,9). Demographic profiles of persons with LD reflect mostly suburban and rural risk. Evidence suggests both continuing geographic spread and increasing incidence over time in established endemic foci (6,7).

The diagnosis of LD is based principally on clinical findings, and results of serologic testing are supportive. Serologic tests for LD are not standardized, and problems in the reliability and accuracy of serologic test results have limited their usefulness for surveillance purposes. CDC, in collaboration with the Association of State and Territorial Public Health Laboratory Directors, held a workshop on standardized serologic testing for LD in March 1993, and an evaluation of a standardized testing protocol by selected public health laboratories will be conducted during May-August 1993.

Although the numbers of LD cases reported by some states have fluctuated by year, the annual number of reported cases in the United States has remained relatively constant during 1989-1992, possibly reflecting the implementation of the uniform case definition and standardized reporting. However, the true incidence of LD in the United States is unknown, and estimates are subject to the influences of underreporting, misclassification, and overdiagnosis. The development of standardized, sensitive and specific serologic tests and better surveillance should result in improved estimates of LD.

References

1. Schmid GP, Horsley R, Steere AC, et al. Surveillance of Lyme disease in the United States, 1982. J Infect Dis 1985;151:1144-9.
2. CDC. Case definitions for public health surveillance. MMWR 1990;39(no. RR-13):19-21.
3. CDC. Summary of notifiable diseases--United States, 1991. MMWR 1992;40(no. 53).

4. Oliver JH, Owsley MR, Hutcheson HJ, et al. Conspecificity of the ticks Ixodes scapularis and I. dammini (Acari: Ixodidae). J Med Entomol 1993;30:54-63.
5. Dennis DT. Epidemiology. In: Coyle PK, ed. Lyme disease. St. Louis: Mosby-Year Book, 1993:27-37.
6. Cartter ML, Mshar P, Hadler JL. The epidemiology of Lyme disease in Connecticut. Conn Med 1989;53:320-3.
7. White DJ, Chang H-G, Benach JL, et al. The geographic spread and temporal increase of the Lyme disease epidemic. JAMA 1991;266:1230-6.
8. Institute of Medicine. Factors in emergence. In: Lederberg J, Shope RE, Oaks SC Jr, eds. Emerging infections: microbial threats to health in the United States. Washington, DC: National Academy Press, 1992:34-112.
9. Dennis DT. Lyme disease: tracking an epidemic [Editorial]. JAMA 1991;266:1269-70.

This article was reprinted with slight modifications from the **Morbidity and Mortality Weekly Report** Vol. 42, No. 18, May 14, 1993; pp. 345-348.

COOPERATIVE AGREEMENT FUNDING FOR LYME DISEASE – 1993

In 1991, Congress approved a three year funding program for research and public education in Lyme disease. Initial proposals were received from state and local health departments, universities, and private foundations. Proposals were evaluated competitively on scientific and/or educational merit and awarded first in 1991 with yearly review and renewal through fiscal year 1993, the final year in the appropriation cycle for these funds. The availability of funding beginning in 1994 will depend on Congressional appropriation of additional funds.

The following Table summarizes the distribution of funds by categories for this final year of the current cycle.

Cooperative Agreements/
Lyme Disease, FY 1993

Funding By Research Category

RESEARCH CATEGORY	AMOUNT	PERCENT
DIAGNOSIS	$810,625	30.0
EDUCATION	$677,290	25.1
SURVEILLANCE/ EPIDEMIOLOGY	$454,928	16.9
PREVENTION/CONTROL	$382,630	14.2
ECOLOGY	$373,006	13.8
TOTALS	$2,698,479	100.0

PROGRESS IN STANDARDIZED SEROLOGIC TESTING FOR LYME DISEASE

Since 1989 the Association of State and Territorial Public Health Laboratory Directors and CDC have worked closely to develop and implement more reliable serologic test methods to aid in the diagnosis of Lyme Disease. During the week of March 22, 1993, 12 state health department laboratories participated in a Lyme disease diagnostic workshop held at Division of Vector-Borne Infectious Diseases, CDC, Fort Collins, Colorado. The workshop was designed to train laboratory personnel to perform a flagellin-based ELISA (FLA-ELISA) and a Western blot using a low passage strain of *Borrelia burgdorferi* as antigen. The test reagents, methods of performance, and interpretation of results were standardized.

A pilot evaluation of the standardized FLA-ELISA and Western blot procedures is in progress. Participating state laboratories will be using standardized protocols for data collection and reporting of results first from a panel of blind coded specimens and finally from specimens submitted for diagnostic testing.

The implementation of these standardized tests represents an important initial step in the ongoing effort by ASTPHLD and CDC to improve the quality of Lyme disease serodiagnosis.

REPORTING OF LYME DISEASE CASES IN 1993 BY NETSS

The numbers of Lyme disease cases reported by states through NETSS in the period January through June 6, 1993 are shown in Figure 3. Of the total 1,493 cases reported through Week 23, 1,021 (81%) were reported from the mid-Atlantic and New England regions. Upstate New York and Pennsylvania have reported 911 (61%) of the cases during this 1993 period.

POSITION OPENING

MICROBIOLOGIST GM-403 13/14

Applications are invited for the position of Research Microbiologist, Bacterial Zoonoses Branch, DVBID, NCID, Centers for Disease Control in Fort Collins Colorado. Candidates should have a demonstrated record of outstanding performance in diagnostic and research microbiology. Applicants must have a Ph.D., or equivalent demonstrated experience in performing and supervising diagnostic and research microbiology. Salary range: $47,920-$56,627. Additional information: Bonnie Blandford (303) 221-6443.

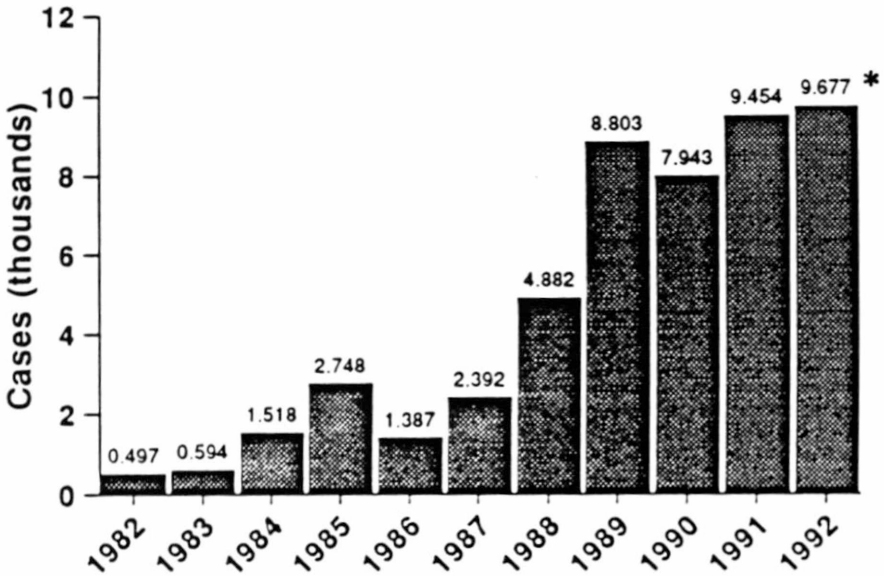
Send completed SF-171 and Curriculum Vitae and the names of 3 references to CDC, 1600 Clifton Road, Atlanta, GA 30333. Attn: Janie Oddy, Personnel Management Office, Mailstop D-44. Closing date July 30, 1993. CDC is an Equal Opportunity Employer and provides a smoke-free work environment.

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:

CDC/DVBID
Lyme Disease Surveillance Summary
P.O. Box 2087
Fort Collins CO 80522

Figure. 1

REPORTED CASES OF LYME DISEASE UNITED STATES, 1982-1992

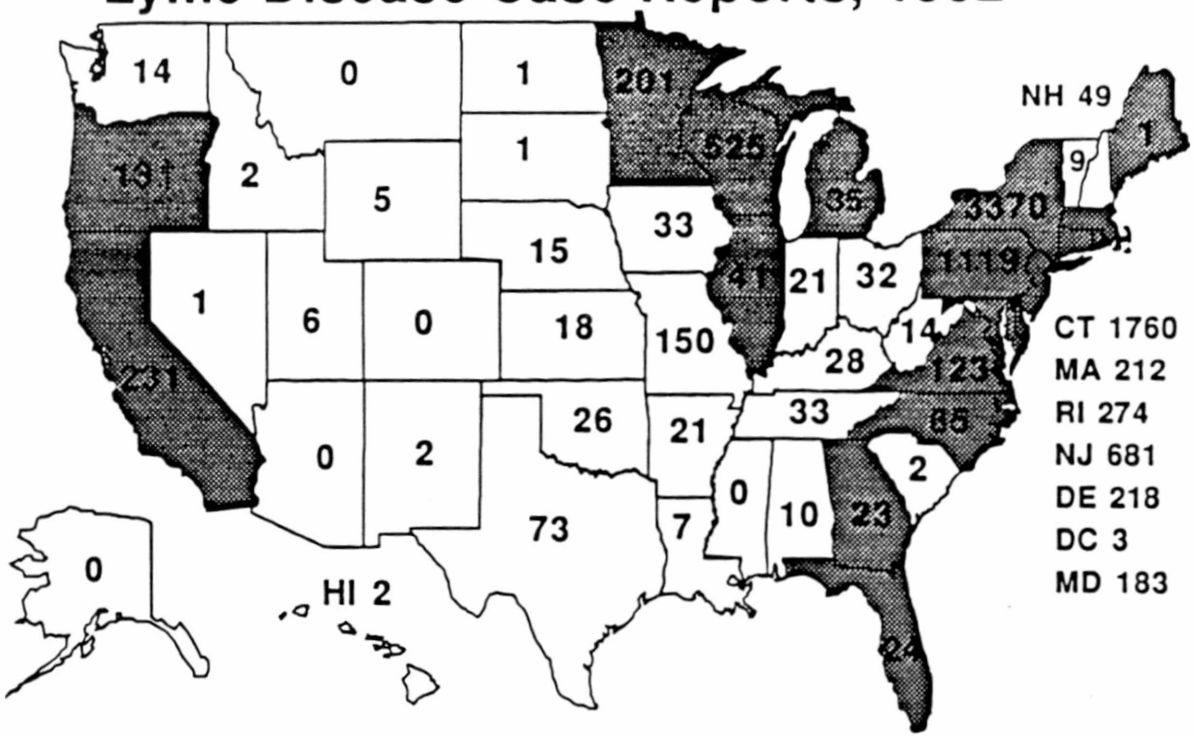


CDC

* Provisional data

Figure 2.

Lyme Disease Case Reports, 1992*



*Provisional Numbers

† Voluntary reporting

CDC

States in which established enzootic foci have been identified

Figure 3.
Reported Lyme Disease Cases by Week of Report, U.S., 1993