

LYME disease

SURVEILLANCE SUMMARY

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

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1995 Cooperative Agreement Awards

Awards have been made for the FY 1995 Centers for Disease Control and Prevention (CDC) Cooperative Agreements to Conduct Research, Treatment and Education Programs on Lyme Disease in the United States, Announcement Number 400. This is the second year in the second 3-year cycle for CDC Lyme disease cooperative agreement funding.

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proposals represent a broad range of programmatic topics: surveillance and epidemiologic
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y, prevention and control; diagnosis and pathogenesis; and education. A listing of principal
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institutions and, project titles is given in Table 1.

The two categories that received the greatest funding were laboratory diagnosis and ecology, prevention and control, accounting for 60% of the total award (Table 2). The Middle Atlantic and Northeast regions received two-thirds of the total funding (Table 3), and also accounted for the greatest numbers of awards (Table 4). Recipients in New York and Connecticut, the states with the greatest numbers of reported cases of Lyme disease, accounted for 10 of the 25 awards and 42% of the total funding (Table 4). Academic research institutions competed most successfully for funds as a single category, although health departments and non-profit foundations together received 56% of the funding (Table 5).

Lyme Disease Education

A recent study by CDC has shown that persons who believe their risk for Lyme disease to be moderate or high and who know some or a lot about Lyme disease are more likely to take personal protective measures against tick bites (unpublished data). Education is a high priority in the CDC Lyme Disease Prevention Program. Of the \$2.7 million in Cooperative Agreement funds spent annually, an average of about 25% or \$675,000 is spent to educate the public and medical community about this arthropod-borne disease. Funds are awarded competitively. All educational materials produced with CDC funding have been reviewed by CDC staff for scientific accuracy and completeness. The target audiences for these materials range from elementary through high school children, gardeners, hunters, employers, self-help groups, and health professionals. Tables 6-11 provide a comprehensive listing of educational videos, brochures, and slide sets available by organization. contact the listed organization for information on the availability and cost of these educational materials.

TABLE 1. CDC EXTRAMURAL FUNDING FOR LYME DISEASE RESEARCH, FISCAL YEAR 1995

ORGANIZATION	P.I.	TITLE
<u>California</u> University of California, Berkeley	Lane	The Ecology and Control of Lyme Disease in CA
<u>Connecticut</u> Connecticut Health Department Lyme Disease Foundation Yale University School of Medicine Yale University School of Medicine	Carter Forschner Flavell Fish	Lyme Disease Research, Surveillance and Education Program Lyme Disease Education for Health Professionals & Their Patients Serologic Diagnosis of Lyme Disease Using Recombinant <i>B. burgdorferi</i> Antigens Rapid Assessment and Prevention of Emerging Foci of Lyme Disease
<u>Georgia</u> Georgia Southern University	Oliver	Distribution, Prevalence, and Vectors of <i>B. burgdorferi</i> in GA, FL and MO
<u>Illinois</u> University of Illinois	Jones	Integrated Management of <i>Ixodes scapularis</i> in the North Central U.S.
<u>Louisiana</u> Tulane University	Philipp	Pathogenesis of Lyme Borreliosis in the Rhesus Monkey: Pathological, Immunological, and Molecular Studies
<u>Massachusetts</u> New England Medical Center Harvard University	Steere Pollack	Measurement of Public Health Impact of Late-Stage Lyme Disease Community-Based Monitoring of Lyme Disease Risk
<u>Michigan</u> Michigan Health Department	Hall	Lyme Disease Active Surveillance in MI
<u>Minnesota</u> Mayo Clinic Minnesota Health Department	Persing Moen	Lyme Disease Pathogenesis Lyme Disease Surveillance and Prevention
<u>New Jersey</u> New Jersey Health Department	Spitalny	Lyme Disease Epidemiology, Control, and Education in NJ
<u>New York</u> New York Health Department SUNY-Stonybrook New York Health Department New York Medical College New York Medical College American Lyme Disease Foundation	White Luft Bosler Wormser Nadelman Weld	Lyme Disease Epidemiology and Education in NY Rapid and Specific Diagnosis of Lyme Disease Bionomics and Approaches to the Control of <i>Ixodes scapularis</i> Culture Positive Lyme Borreliosis Antibiotic Prophylaxis for <i>Ixodes</i> Tick Bites in Westchester County, NY Lyme Disease Education
<u>Oregon</u> Oregon Health Department	Hedberg	Lyme Disease Epidemiology
<u>Pennsylvania</u> American College of Physicians	So	Educational Programs for Physicians on Lyme Disease Diagnosis and Treatment
<u>Rhode Island</u> Rhode Island Health Department	Matyas	RI Lyme Disease Surveillance System
<u>West Virginia</u> West Virginia Health Department	Haddy	Epidemiology of Lyme Disease
<u>Wisconsin</u> Marshfield Clinic	Rood	Lyme Disease in Central WI

TABLE 2.**CDC Extramural Funding
for Lyme Disease Research
FY 1995
Funding by Category**

Category	Amount	% of Total Funds
Diagnosis	833,250	30.94
Ecology/Prevention & Control	802,317	29.79
Surveillance / Epidemiology	512,331	19.02
Education	545,101	20.24
TOTAL	\$2,692,999	99.99

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TABLE 3.**CDC Extramural Funding for Lyme Disease Research
FY 1995****Funding by Geographic Region**

Geographic Region	Amount	% of Total Funds
Middle Atlantic	984,943	36.57
Northeast	838,220	31.13
North Central	462,066	17.16
South Atlantic	272,453	10.12
Pacific	135,317	5.02
TOTAL	\$2,692,999	100.00

CDC/NCID/DVBID

TABLE 4.**Lyme Disease Cooperative Agreements FY 1995
Awards and Funds by State for Research/Education**

STATE	AWARDS	FUNDING
New York	6	632,162
Connecticut	4	506,970
Minnesota	2	324,000
Massachusetts	2	240,000
Pennsylvania	1	220,000
Louisiana	1	160,000
Georgia	1	112,453
New Jersey	1	111,312
California	1	100,000
Rhode Island	1	91,250
Illinois	1	70,000
Wisconsin	1	38,250
Oregon	1	35,317
Michigan	1	29,816
West Virginia	1	21,469
TOTAL	25	\$2,692,999

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TABLE 5.**CDC Funding for Lyme Disease Research
FY 1995
Funding by Type of Institution**

Type of Institution	No. Funded	Amount	% of Total Funds
Academic	11	1,187,925	44.11
Health Dept.	9	996,824	37.02
Private	5	508,250	18.87
TOTAL	25	\$2,692,999	100.00

CDC/NCID/DVBID

TABLE 6. EDUCATIONAL MATERIAL FOR SCHOOL-AGE CHILDREN

TITLE	TYPE	TARGET AUDIENCE	INSTITUTIONAL SOURCE
Lyme Disease: The Case of the Great Imitator	Video	Junior High	American Lyme Disease Foundation
Tick Talk	Video	Elementary	American Lyme Disease Foundation
Lyme Disease Bulletin: Fight the Bite	Video	All ages	Connecticut Arthritis Foundation
Fight the Bite Video Game	Video	Upper Elementary through High School	Connecticut Arthritis Foundation
Lyme Disease: The Curse of the Blood Suckers	Video	Junior High	Connecticut State Health Department
Tick Invaders	Video	Upper Elementary	Connecticut State Health Department
Do a Tick Check/WTIK	Video English/Spanish	Elementary to Junior High	Lyme Disease Foundation
Dr. Ticked Off and His Tick Patrol	Video	Elementary	Lyme Disease Foundation
Lyme Disease: An Investigative Survey on Personal Prevention	Video	Junior High	Lyme Disease Foundation
Lyme Disease: Facts for Kids	Video English/Spanish	Junior High	Lyme Disease Foundation
Tick Tales	Brochure and Video	Upper Elementary to Junior High	Marshfield Clinic
Camp Education	Packet	Elementary	New York State Health Department
Kiosk Software Training Program	Computer Software	Upper Elementary to Adult	New York State Health Department
Understanding Lyme Disease	Video	Elementary	Pennsylvania State University
Lyme Disease: Out-smarting the Deer Tick	Video	Junior High to Adult	Pennsylvania State University
Workbook for Video	Book	Elementary to High School	Pennsylvania State University

Elementary = grades 1-6 Junior High = - grades 7-9 High School = - grades 10-12

TABLE 7. ADULT EDUCATIONAL MATERIALS

Title	Type	Institutional Source
A Quick Guide to Lyme Disease	Brochure	American Lyme Disease Foundation
Fight the Bite	Poster English/Spanish	Connecticut Arthritis Foundation
Lyme Disease	Poster	Connecticut Arthritis Foundation
Lyme Disease Diagnosis and Treatment	Video	Lyme Disease Foundation
Lyme Disease: Operating and Participating in a Self-Help Group	Video	Lyme Disease Foundation
Lyme Disease, What You Should Know	Video	Lyme Disease Foundation
Lyme Disease: Workplace Awareness and Prevention	Video	Lyme Disease Foundation
Lyme Disease Prevention for Sportsmen, Gardeners, and Outdoor Professionals	Video	New York State Department of Health
Lyme Disease	Brochure English/Spanish	New York State Department of Health
What You Should Know About Lyme Disease	Wall Chart	New York State Department of Health
Lyme Disease	Brochure	Pennsylvania State University

TABLE 8. MATERIAL FOR EDUCATORS

Title	Type	Institutional Source
Lyme Disease: Consensus to Care	Video	American College of Physicians
Video Workbook	Book	American Lyme Disease Foundation
Leader's Manual	Packet	Marshfield Clinic
Lyme School Education Packets (K-4)	Folder	New York State Department of Health
Glossary of Ticks and Tick-Borne Diseases	Brochure	Pennsylvania State University
Lyme Disease Extension Workbook (for Health Care Providers)	Book	Pennsylvania State University
Tick Identification Computer Software	Computer Software	Pennsylvania State University
Video Workbook	Book	Pennsylvania State University

TABLE 9. MATERIAL FOR BROADCAST MEDIA

Title	Type	Provider
Public Service Announcements	Radio/TV	American Lyme Disease Foundation
Public Service Announcements	Radio/TV	Lyme Disease Foundation
Public Service Announcements	Radio/TV	Pennsylvania State University

TABLE 10. INSTITUTIONAL SOURCE

Institution	Phone Number
American College of Physicians	(215) 351-2830
American Lyme Disease Foundation	(914) 934-9155
Connecticut Arthritis Foundation	(203) 563-1177
Connecticut State Health Department	(203) 566-5058
Lyme Disease Foundation	(203) 871-2900
Marshfield Clinic	(715) 387-5066
Minnesota Department of Health	(612) 623-5363
New Jersey State Health Department	(609) 588-7500
New York State Health Department	(518) 474-4568
Pennsylvania State University	(814) 863-7076
Rhode Island Health Department	(401) 277-2432

TABLE 11. LYME DISEASE INFORMATION "HOTLINE" NUMBERS

Institution	Phone Number
American Lyme Disease Foundation	800-876-5963
Arthritis Foundation	800-283-7800
Centers for Disease Control and Prevention	404-332-4555
Lyme Disease Foundation	800-886-5963

Recent Journal Articles

From the Bacterial Zoonoses Branch, Division of Vector-Borne Infectious Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Fort Collins, Colorado

Campbell GL, Paul WS, Schriefer ME, Craven RB, Robbins KE, and Dennis DT. Epidemiologic and diagnostic studies of patients with suspected early Lyme disease, Missouri, 1990-1993. J Infect Dis 172:470-80; 1995.

Abstract. A retrospective case-control study investigated 45 Missouri outpatients with annular rashes meeting a surveillance case definition for erythema migrans and with onset in 1990-1991. Risk factors included being male, living near a body of water, and hunting. Twenty patients (44%) associated their rash with the bite of a tick; of these, 5 described an adult *Amblyomma americanum*. A typical rash was described as expanding over time and measuring 8 cm in diameter at 4 days after onset. Mild constitutional symptoms were common but fever was uncommon. Serologic tests failed to incriminate *Borrelia burgdorferi* or selected other arthropodborne pathogens. Skin specimens from suspected erythema migrans lesions of 23 Missouri patients sampled prospectively in 1991-1993 were culture-negative for *B. burgdorferi*. Thus, tick bite-associated annular rashes in Missouri remain idiopathic. Possible causes include infection with a novel *A. americanum*-transmitted pathogen and an atypical toxic or immunologic reaction to tick-associated proteins.

Piesman J. Dispersal of the Lyme disease spirochete *Borrelia burgdorferi* to salivary glands of feeding nymphal *Ixodes scapularis* (Acari: Ixodidae). J Med Entomol 32(4):519-521; 1995.

Abstract. Salivary gland explant cultures from 3/16 (19%) of unfed nymphal *Ixodes scapularis* Say contained Lyme disease spirochetes, increasing to a maximum of 14/16 (88%) at 72 h of tick feeding. Homogenates of tick salivary glands did not produce infection in laboratory white mice unless harvested from ticks attached for ≥ 60 h. Dispersal of spirochetes to the salivary glands appears to occur during the act of tick feeding, thus affecting the ability of ticks to transmit *Borrelia burgdorferi*.

Schwan TG, Piesman J, Golde WT, Dolan MC, and Rosa PA. Induction of an outer surface protein on *Borrelia burgdorferi* during tick feeding. Proc Natl Acad Sci USA 92:2909-2913; 1995.

Lyme disease spirochetes, *Borrelia burgdorferi sensu lato*, are maintained in zoonotic cycles involving ticks and small mammals. In unfed ticks, the spirochetes produce one outer surface protein, OspA, but not OspC. During infection in mammals, immunological data suggest that the spirochetes have changed their surface, not expressing OspC but little or no OspA. We find by *in vitro* growth experiments that this change is regulated in part by temperature; OspC is produced by spirochetes at 32-37°C but not at 24°C. Furthermore, spirochetes in the midgut of ticks that have fully engorged on mice now have OspC on their surface. Thus two environmental cues, an increase in temperature and tick feeding, trigger a major alternation of the spirochetal outer membrane. This rapid synthesis of OspC by spirochetes during tick feeding may play an essential role in the capacity of these bacteria to successfully infect mammalian hosts, including humans, when transmitted by ticks.

Guidelines for 1996 abstract submission will be mailed in late September. Deadline for submitting abstracts is December 15. If you have any questions about this Congress, please contact Ms. Mary Ellen Fernandez, Fort Collins CO (USA) at 970-221-6426.

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

CDC, DVBD
Lyme Disease Surveillance Summary
P.O. Box 2087
Fort Collins CO 80522
