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Current Trends

Update: Influenza Activity — United States and Worldwide, and Composition of the 1993–94 Influenza Vaccine

In collaboration with the World Health Organization (WHO) international collaborating laboratories and with state and local health departments in the United States, CDC conducts surveillance to monitor influenza activity and to detect antigenic changes in the circulating strains of influenza viruses. This report summarizes surveillance for influenza in the United States and worldwide during the 1992–93 season and describes the composition of the 1993–94 influenza vaccine.

United States

During the 1992–93 influenza season, influenza activity in the United States began in October and increased gradually from December through late February. Recent reports suggest that activity may be declining in some areas. The number of isolates and the ratio of specimens positive for influenza to total specimens submitted for respiratory virus testing declined slightly during late February and early March. Weekly reports by state and territorial epidemiologists indicated increasing levels of influenza-like illness (ILI) from December through late February and a slight decline from late February through early March.

From October through January, influenza B viruses predominated and outbreaks were reported primarily among school-aged persons; outbreak activity reported among older adults was limited, and no excess occurred in influenza-associated mortality. Recent increased circulation of influenza A(H3N2) viruses has been associated with reports of increasing numbers of culture-confirmed outbreaks in nursing homes and other chronic-care facilities.

From September 27, 1992, through March 6, 1993, 1791 (86%) of the 2087 influenza virus isolates reported by the WHO collaborating laboratories in the United States were influenza type B. Influenza B viruses isolated in the United States this season have been antigenically similar to the B/Panama/45/90 virus included in the 1992–93 influenza vaccine. However, the proportion of influenza type A viruses has steadily increased since mid-January. From September 27, 1992, through January 16, 1993, 10 (2%) of the 578 influenza viruses reported were influenza type A compared with 144 (14%) of the 1026 viruses reported for January 17 through February 13 and

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142 (29%) of the 483 viruses reported for February 14 through March 6. Of the 296 influenza A viruses isolated, 22 (7%) were subtyped as A(H1N1) and 115 (39%) as A(H3N2); 159 (54%) have not yet been subtyped. Of the influenza A(H3N2) viruses isolated in the United States this season and characterized at CDC, six were antigenically similar to the vaccine strain A/Beijing/353/89, and 28 were similar to the antigenic variant A/Beijing/32/92 (Table 1).

The proportion of deaths associated with pneumonia and influenza to total deaths reported through CDC's 121-city mortality reporting system exceeded the epidemic threshold for 1 week (ending February 20) but remained below the epidemic threshold for the following 2 weeks.

Worldwide

Influenza activity worldwide has occurred at moderate levels during the 1992–93 season. Influenza viruses have been isolated in association with sporadic activity and outbreaks in Asia, Europe, and North America. Although most activity has been associated with influenza B viruses, influenza A(H3N2) viruses were also isolated during periods of sporadic activity or outbreaks in 21 countries. Isolation of influenza A(H1N1) viruses has been rare.

Influenza B viruses were first reported in France, Japan, and the United States during October 1992 and predominated in all countries reporting influenza during the first months of the season. They remain the most common and widespread viruses isolated in Europe and North America. Influenza B viruses have been isolated in association with outbreaks among schoolchildren in China, Hungary, Japan, Sweden, the United Kingdom, and the United States. Other countries reporting isolation of influenza B viruses include Belgium, Bulgaria, Canada, Croatia, the Czech Republic, Denmark, Finland, France, Germany, Hong Kong, Israel, Italy, Lithuania, the Netherlands, Norway, Portugal, Romania, the Russian Federation, Singapore, the Slovak Republic, Spain, Switzerland, Taiwan, and Thailand.

Although influenza A(H3N2) viruses have been isolated less frequently worldwide, they were first reported in November 1992 during sporadic activity or small outbreaks in Japan, Sweden, and the United States. Japan subsequently reported culture-confirmed widespread outbreaks during December 1992 and January and February 1993. Influenza A(H3N2) viruses were isolated during outbreaks in northern China during late December and January. As of late February, influenza A(H3N2) viruses had

TABLE 1. Hemagglutination-inhibition titers of influenza A(H3N2) viruses with serum specimens from infected ferrets*

	Ferret antiserum	
Viral antigen	**A/Beijing/353/89**	**A/Beijing/32/92**
Reference antigen		
A/Beijing/353/89	**320**	80
A/Beijing/32/92	40	**320**
Recent isolates		
A/Stockholm/01/93	40	320
A/Sapporo/304/92	20	320
A/New York/04/93	40	320

* A fourfold difference in hemagglutination-inhibition titers with two viruses is normally indicative of antigenic variation between viruses.

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also been isolated in Belgium, Bulgaria, Canada, Croatia, the Czech Republic, Finland, France, Germany, Indonesia, Italy, the Netherlands, Norway, Romania, the Russian Federation, Singapore, Spain, and the United Kingdom.

Influenza A(H1N1) viruses have been isolated during periods of sporadic activity in Canada, France, the Netherlands, the United Kingdom, and the United States.

Composition of the 1993–94 Vaccine

For the 1993–94 influenza season, the Food and Drug Administration Vaccines and Related Biologicals Advisory Committee (VRBAC) has recommended that the trivalent influenza vaccine for the United States contain A/Texas/36/91-like(H1N1), A/Beijing/32/92-like(H3N2), and B/Panama/45/90-like viruses. This recommendation was based on the antigenic analysis of recently isolated influenza viruses, the patterns of spread of antigenic variants, and the antibody response of persons previously vaccinated with the 1992–93 influenza vaccine.

More than 300 influenza B viruses isolated worldwide since October 1992 have been characterized antigenically. All are similar to the B/Panama/45/90 vaccine strain, and to the closely related variant B/Qingdao/102/91 (*1*). Vaccines containing B/Panama/45/90-like viruses induced antibodies with similar frequency and titer to the vaccine virus and to representative recent isolates. Therefore, for the 1993–94 vaccine, the VRBAC recommended retaining the current B/Panama/45/90-like vaccine strain.

Although viruses similar to the A/Beijing/353/89 vaccine strain continue to be isolated, antigenic analysis of influenza A(H3N2) viruses indicates that many recently isolated strains from Asia, Europe, and North America are similar to the antigenic variant A/Beijing/32/92 (Table 1). Vaccines containing A/Beijing/353/89-like antigen induced a good response to this vaccine strain. In contrast, this vaccine induced lower and less frequent antibody responses to recent A(H3N2) isolates, such as A/Beijing/32/92, than to the A/Beijing/353/89 vaccine strain (Table 2). Therefore, the VRBAC recommended changing the influenza A(H3N2) vaccine component to an A/Beijing/32/92-like strain for the 1993–94 season.

Although the number of isolates of influenza A(H1N1) viruses has been limited, all those characterized have been closely related to the reference strains A/Taiwan/1/86 or A/Texas/36/91 (*2*). Antibody induced by vaccination with the A/Texas/36/91 vaccine component induced good immune responses to the vaccine strain and to representative recent isolates. Thus, the VRBAC recommended retaining the A/Texas/36/91-like vaccine strain for the 1993–94 vaccine.

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Influenza Activity — Continued

Editorial Note: The recent increase in influenza A activity in the United States indicates a continuing need for surveillance, including culture of specimens from patients with ILI. Although the severity and types of future influenza epidemics cannot be predicted reliably, the recent increased isolation of variant type A(H3N2) viruses suggests that such viruses may predominate during the 1993–94 influenza season.

Strains to be included in the influenza vaccine for the United States are selected from January through March each year to meet the production schedule required for the manufacture, quality control, and distribution of the more than 40 million doses of vaccine before the next influenza season. Specific recommendations for the use of the newly constituted influenza vaccine will be made by the Public Health Service Advisory Committee on Immunization Practices and published in the *MMWR Recommendations and Reports* during May 1993.

TABLE 2. Hemagglutination-inhibition (HI) antibody responses to the A/Beijing/353/89 (H3N2) component of the influenza vaccine*

Age group	No. persons	Virus strain	Prevaccination GMT†	Postvaccination GMT	% With HI titer ≥40
4–52 mos	21	A/Beijing/353/89	28	72	86
		A/Beijing/32/92	<20	23	43
17–25 yrs	30	A/Beijing/353/89	15	156	93
		A/Beijing/32/92	8	43	63
Elderly (mean age: 85 yrs)	65	A/Beijing/353/89	21	47	78
		A/Beijing/32/92	9	16	30

*Volunteers received trivalent vaccine from the 1991–92 or 1992–93 seasons containing 15 μg of the A/Beijing/353/89 (H3N2) component.
†Geometric mean titer.

Sources of serum: University of Colorado, Denver; Goodwin House, Inc., Alexandria, Virginia.

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Epidemiologic Notes and Reports

Malaria in Montagnard Refugees — North Carolina, 1992

Refugee groups emigrating from some areas of the world may have increased prevalences of exotic and potentially life-threatening diseases, challenging the diagnostic and case-management capacities of local and state health departments. This report summarizes efforts by public health officials and clinical health-care providers to diagnose and manage cases of malaria among a group of 402 Montagnard refugees who resettled to three counties in North Carolina in November 1992.

Since 1976, this group of Montagnard refugees has lived in a remote, densely forested area along the Cambodian-Vietnamese border where transmission of *Plasmodium vivax* and multidrug-resistant *P. falciparum* is intense. Before immigrat-

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ing to the United States, the Montagnards spent 1 month in Phnom Penh, Cambodia, where they received routine physical examinations and screenings for human immunodeficiency virus, syphilis, tuberculosis, and other excludable physical and mental conditions. Of the 402 persons in this group, 299 (74%) were male, and 80 (20%) were children aged <10 years. Members of the group were resettled in Guilford County (175), Mecklenburg County (159), and Wake County (68). Within 1 month of arrival, one Montagnard died (from empyema and gram-negative sepsis), 16 were hospitalized, and 36 had illnesses requiring emergency medical assessment. Five cases of malarial illness were reported among members of the group in one county.

Because an initial assessment among 20 persons detected a 35% prevalence of parasitemia with either *P. falciparum* or *P. vivax*, all Montagnards were screened using quantitative buffy coat (QBC*) evaluation followed by thick and thin blood-smear examination. Self-reported history of fever was recorded at the time of blood collection to determine the association between fever and parasitemia among this group.

Of the 376 persons for whom QBC and/or thick-smear results were available, 178 (47%) were infected with one or more species of *Plasmodium*; 25 persons had been treated previously or were unavailable for screening. Among infected persons, 93 (52%) had *P. falciparum*, 71 (40%) had *P. vivax*, and five (3%) had *P. malariae*; 35 (20%) had *Plasmodium* parasites of unknown species. Infections with more than one species of *Plasmodium* were documented in 39 (22%) parasitemic persons. Among 161 persons with slide-positive malaria for whom a fever history was recorded, 27 (17%) reported having fever since arriving in the United States, suggesting a high level of acquired immunity to malarial illness among this group.

Because of the high prevalence of asymptomatic infection, all 402 members of the group were treated with halofantrine (Halfan*). Halofantrine was administered because *P. falciparum* strains from Southeast Asia are commonly resistant to other available antimalarials, including partial resistance to quinine. Halofantrine is highly effective against the blood stage of malaria parasites but has no effect on the liver stage of *P. vivax* (hypnozoites), which can produce malaria relapses for 3–5 years after initial infection. The risk for *P. vivax* relapse can be decreased by treating infected persons with primaquine (the only available antimalarial that is active against hypnozoites); however, because primaquine can cause severe hemolytic anemia in patients deficient in the red blood cell enzyme glucose-6-phosphate dehydrogenase (G6PD), all refugees for whom primaquine was indicated were screened for G6PD deficiency. Of 358 persons screened, 11 (3%) had G6PD deficiency of sufficient severity to preclude the use of primaquine.

After treatment, group sessions were held to inform the Montagnards, community leaders, and the staff of the sponsoring agencies about the risk for malaria relapse and the importance of early diagnosis and treatment. In addition, guidelines for the proper diagnosis and treatment of malaria were disseminated to selected health-care providers.

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*Use of trade names and commercial sources is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

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Editorial Note: The resettlement of the Montagnard refugees within 2 months of leaving an area of intense malaria transmission, without screening or presumptive treatment for malaria parasitemia, resulted in higher levels of malaria infection than previously seen in Southeast Asian refugees on arrival to the United States. This high prevalence might have been anticipated, because 25%–49% of persons entering Thai refugee camps from forested regions of Cambodia in the early 1980s were parasitemic (*1,2*). Unlike the Montagnards, these refugees typically remained in temporary resettlement camps in Asia for 4–5 months before arrival in the United States. Although the primary purpose of these camps was to provide cultural information and language training before immigration, this period also provided an opportunity to detect and treat malaria and other medical conditions. As a result, in 1980, among 3433 Indochinese (Laotian, Cambodian, and Vietnamese) refugees resettled in the United States, the prevalence of parasitemia was less than 2% (*3*).

Malaria was one of many health problems among these refugees; however, requirements for diagnosis, treatment, and management of malaria exceeded the capacity of the local and state health departments, many of which are neither staffed nor funded to provide primary health care. County health departments estimated that as long as 14 weeks would be needed to complete initial medical screening of the refugees, and the capacity of the state laboratory was exceeded by the need to rapidly process nearly 40 times the annual expected number of malaria slides. Even with technical assistance from CDC, malaria-specific screening and treatment procedures required 8 weeks for completion.

Although mosquitoes capable of transmitting malaria exist in North Carolina, local transmission of malaria is unlikely for at least three reasons. First, these Montagnard refugees arrived in November, when temperatures were low enough to preclude survival of anopheline mosquitoes. Second, when warmer ambient temperatures enable increases in the mosquito population, the housing conditions (including the presence of window screens) for persons in this group substantially decrease the likelihood that parasitemic persons will be exposed to anopheline mosquitoes. In recent periods, local transmission in the United States has occurred only when large groups of infected persons have resided outdoors or in substandard housing (e.g., migrant workers encamped in southern California [*4*]). Finally, any theoretical risk of local transmission in this setting will be further diminished by the presumptive treatment of all members of the resettled group, ongoing case detection and treatment of relapses, and administration of antimalarials to prevent relapses.

Expertise for prompt and accurate diagnosis of malaria and other exotic but potentially life-threatening medical problems in a large number of persons is limited in most local and state health departments (*5*). As a result, laboratory services and personnel can be quickly overwhelmed. Refugees who immigrate to the United States from tropical areas, among whom prevalences of malaria or other infectious diseases may be high, should receive medical screening and appropriate treatment under well-controlled conditions before departing for the United States. When this is not possible, medical personnel, laboratory support services, and other resources should be made

Malaria — Continued

available to local and state health departments to ensure adequate and timely health care.

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Current Trends

Inability of Retroviral Tests to Identify Persons with Chronic Fatigue Syndrome, 1992

Chronic fatigue syndrome (CFS) is characterized by prolonged, debilitating fatigue (*1*). Although the cause of CFS unknown, CDC and researchers in other organizations have been investigating whether infection with a previously unidentified retrovirus might be an etiologic factor. Based on reports suggesting that retroviral infection with a human T-lymphotropic virus type 2 (HTLV-II)-like retrovirus or a spumavirus might be associated with CFS (*2,3*), some research and commercial laboratories developed assays to test specimens from persons with CFS. Even though the hypothesized association between infection with retroviruses and CFS has not been confirmed, these tests are used commonly to evaluate patients with CFS. This report summarizes the findings of a controlled, blinded study conducted in 1992 to determine whether three retroviral tests can distinguish serologically between patients with CFS (i.e., case-patients) and healthy controls.

Blood samples were obtained from 68 case-patients from four study populations (northern New Jersey [n=29 and n=14]; Charlotte, North Carolina [n=10]; and Lyndonville, New York [n=15 adolescents aged 11–21 years]*) whose illnesses met the published case definition for CFS (*1*). For each of the 68 CFS case-patients, one healthy convenience control was selected from the same geographic area and matched for age, sex, and race.† Specimens were assigned random code numbers so those from case-patients could not be distinguished from those of controls.

Blood samples from case-patients and controls were sent to two laboratories that had developed retroviral tests based on previous reports (*2,3*). Laboratory A performed testing with an original polymerase chain reaction (PCR) assay and a modification of the same assay (developed using the methodology that revealed nucleic acid sequences suggestive of an HTLV-II-like retrovirus). Laboratory B performed testing by culturing lymphocytes to identify the foamy cell cytopathic effect that is

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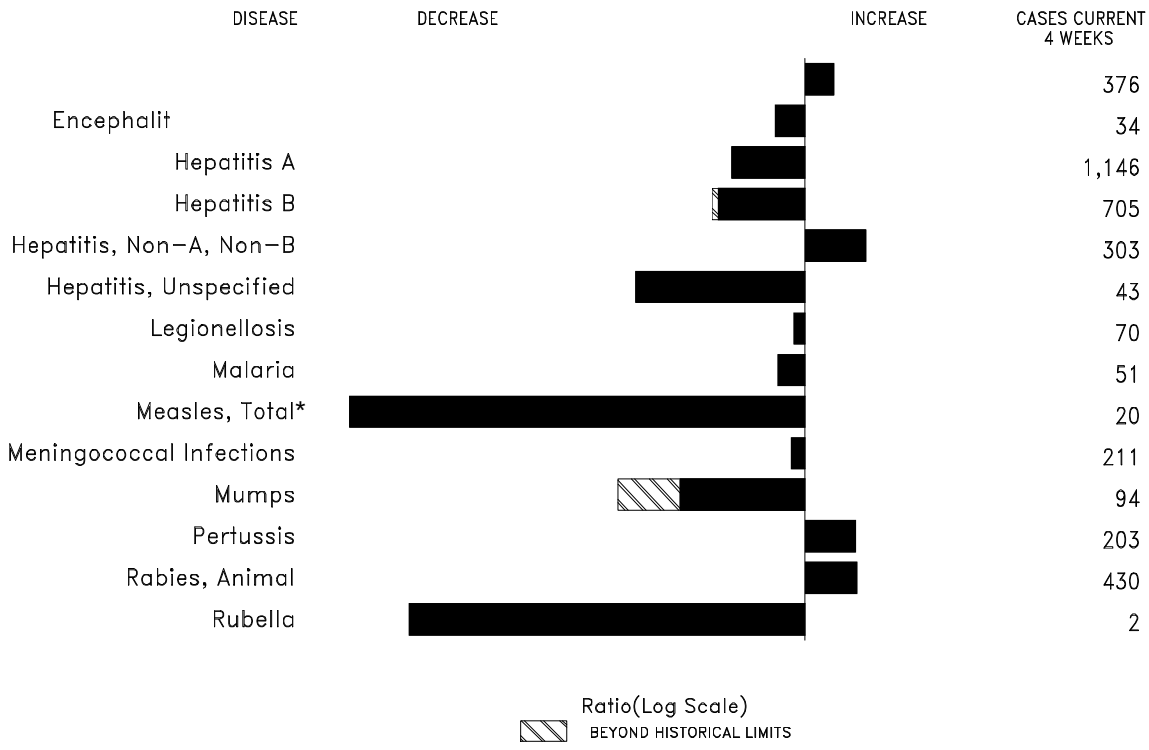
*Case-patients from the other three study populations were aged 18–62 years (median age for all study populations combined: 37.5 years).
†Case-patients were matched because CFS occurs primarily among white women (average age at onset: 30.2 years) (*4*).

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending March 13, 1993, with historical data — United States



*The large apparent decrease in reported cases of measles(total) reflects dramatic fluctuations in the historical baseline.

† Ratio of current 4-week total to mean of 15 4-week totals (from previous, comparable, and subsequent 4-week periods for the past 5 years). The point where thehatched area begins is based on the mean and two standard deviations of these 4-week totals.

TABLE I. Summary — cases of specified notifiable diseases, United States, cumulative, week ending March 13, 1993 (10th Week)

	Cum. 1993		Cum. 1993
AIDS*	10,300	Measles: imported	4
Anthrax	-	indigenous	43
Botulism: Foodborne	1	Plague	-
Infant	10	Poliomyelitis, Paralytic§	-
Other	1	Psittacosis	13
Brucellosis	9	Rabies, human	-
Cholera	4	Syphilis, primary & secondary	5,345
Congenital rubella syndrome	1	Syphilis, congenital, age < 1 year	-
Diphtheria	-	Tetanus	3
Encephalitis, post-infectious	28	Toxic shock syndrome	47
Gonorrhea	71,155	Trichinosis	6
Haemophilus influenzae (invasive disease)†	228	Tuberculosis	2,566
Hansen Disease	16	Tularemia	11
Leptospirosis	10	Typhoid fever	56
Lyme Disease	419	Typhus fever, tickborne (RMSF)	20

*Updated monthly; last update February 27, 1993.
†Of 210 cases of known age, 77 (37%) were reported among children less than 5 years of age.
§No cases of suspected poliomyelitis have been reported in 1993; 4 cases of suspected poliomyelitis were reported in 1992; 6 of the 9 suspected cases with onset in 1991 were confirmed; all were vaccine associated.

TABLE II. Cases of selected notifiable diseases, United States, weeks ending March 13, 1993, and March 7, 1992 (10th Week)

Reporting Area	AIDS*	Aseptic Meningitis	Encephalitis		Gonorrhea		Hepatitis (Viral), by type				Legionellosis	Lyme Disease
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993
UNITED STATES	10,300	1,173	98	28	71,155	86,714	3,704	1,860	766	114	204	419
NEW ENGLAND	679	27	3	-	1,691	2,116	134	85	1	2	8	47
Maine	8	4	1	-	13	24	4	1	-	-	1	-
N.H.	47	2	-	-	9	31	2	11	-	-	-	5
Vt.	3	2	-	-	9	2	2	1	-	-	-	-
Mass.	403	15	2	-	637	779	79	63	1	2	6	14
R.I.	29	4	-	-	82	153	32	9	-	-	1	14
Conn.	189	-	-	-	941	1,127	15	-	-	-	-	14
MID. ATLANTIC	2,506	99	3	3	6,664	8,841	182	203	43	3	41	287
Upstate N.Y.	236	52	-	1	1,144	569	69	61	20	1	7	171
N.Y. City	1,841	5	-	-	1,541	4,574	10	1	-	-	-	-
N.J.	195	-	-	-	1,485	1,176	72	70	16	-	7	16
Pa.	234	42	3	2	2,494	2,522	31	71	7	2	27	100
E.N. CENTRAL	787	177	28	6	15,094	17,790	469	205	156	2	67	4
Ohio	137	65	11	-	4,802	5,475	81	53	15	-	37	4
Ind.	277	31	2	2	1,595	1,760	278	43	3	-	14	-
Ill.	106	22	2	-	4,758	5,151	62	17	2	1	-	-
Mich.	224	55	11	4	3,219	4,686	45	91	133	1	16	-
Wis.	43	4	2	-	720	718	3	1	3	-	-	-
W.N. CENTRAL	377	61	2	-	3,495	6,177	629	143	35	2	10	10
Minn.	209	5	2	-	320	603	78	9	1	1	-	1
Iowa	40	18	-	-	329	326	5	5	2	1	-	1
Mo.	40	17	-	-	2,023	4,091	429	113	22	-	2	-
N. Dak.	-	1	-	-	10	19	10	-	-	-	-	-
S. Dak.	17	3	-	-	31	45	8	-	-	-	-	-
Nebr.	26	1	-	-	-	8	70	3	6	-	6	-
Kans.	45	16	-	-	782	1,085	29	13	4	-	2	8
S. ATLANTIC	2,357	307	16	13	20,049	27,110	229	306	114	23	29	45
Del.	120	2	1	-	275	324	2	28	39	-	5	29
Md.	222	23	5	-	3,203	3,204	35	65	4	1	13	7
D.C.	176	8	-	-	1,262	1,602	1	5	-	-	3	1
Va.	20	39	5	3	1,239	3,962	32	23	4	11	-	3
W. Va.	3	4	4	-	130	181	-	5	2	3	-	1
N.C.	57	18	1	-	5,108	3,526	10	24	11	-	2	3
S.C.	54	2	-	-	1,353	2,302	3	7	-	-	-	-
Ga.	268	21	-	-	2,791	12,009	29	24	19	-	2	-
Fla.	1,437	190	-	10	4,688	-	117	125	35	8	4	1
E.S. CENTRAL	613	81	5	1	8,289	8,871	52	209	189	-	13	3
Ky.	53	38	1	1	936	952	30	19	3	-	2	-
Tenn.	196	19	4	-	2,578	2,830	11	167	182	-	9	2
Ala.	230	19	-	-	2,821	3,063	9	21	3	-	-	1
Miss.	134	5	-	-	1,954	2,026	2	2	1	-	2	-
W.S. CENTRAL	950	40	9	-	9,240	8,745	216	145	24	20	6	3
Ark.	127	7	-	-	1,121	1,784	10	13	2	-	-	1
La.	172	1	-	-	2,012	1,492	8	18	10	-	1	-
Okla.	108	-	3	-	549	978	21	25	9	1	5	2
Tex.	543	32	6	-	5,558	4,491	177	89	3	19	-	-
MOUNTAIN	695	58	5	3	1,956	2,220	737	116	58	25	17	2
Mont.	3	-	-	1	13	14	37	4	-	-	-	-
Idaho	20	2	-	-	20	23	59	8	-	1	1	-
Wyo.	18	-	-	-	14	6	4	4	16	-	2	2
Colo.	303	16	2	-	629	922	207	13	10	16	1	-
N. Mex.	78	11	1	2	208	175	53	52	18	-	-	-
Ariz.	31	16	2	-	683	683	220	23	6	5	5	-
Utah	77	1	-	-	45	41	146	3	6	3	1	-
Nev.	165	12	-	-	344	356	11	9	2	-	7	-
PACIFIC	1,336	323	27	2	4,677	4,844	1,056	448	146	37	13	18
Wash.	85	-	-	-	726	693	103	34	22	2	2	-
Oreg.	88	-	-	-	271	291	31	13	3	-	-	-
Calif.	1,149	307	24	2	3,502	3,640	739	394	119	34	10	18
Alaska	4	3	2	-	101	121	163	3	-	-	-	-
Hawaii	10	13	1	-	77	99	20	4	2	1	1	-
Guam	-	-	-	-	11	21	-	-	-	-	-	-
P.R.	522	15	-	-	88	15	6	44	3	-	-	-
V.I.	33	-	-	-	19	13	-	1	-	-	-	-
Amer. Samoa	-	-	-	-	5	5	3	-	-	-	-	-
C.N.M.I.	-	2	-	-	11	5	-	-	-	-	-	-

N: Not notifiable U: Unavailable C.N.M.I.: Commonwealth of Northern Mariana Islands

*Updated monthly; last update February 27, 1993.

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending March 13, 1993, and March 7, 1992 (10th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1993	1993	Cum. 1993	1993	Cum. 1993	Cum. 1992	Cum. 1993	1993	Cum. 1993	1993	Cum. 1993	Cum. 1992	1993	Cum. 1993	Cum. 1992
UNITED STATES	131	3	43	1	4	336	464	19	280	84	466	212	-	16	30
NEW ENGLAND	20	1	23	-	1	4	34	-	2	55	135	15	-	1	4
Maine	-	-	-	-	-	-	3	-	-	-	3	1	-	1	-
N.H.	2	-	-	-	-	-	5	-	-	51	102	4	-	-	-
Vt.	-	1	20	-	1	-	4	-	-	-	12	-	-	-	-
Mass.	9	-	-	-	-	2	18	-	1	2	13	10	-	-	-
R.I.	1	-	-	-	-	-	-	-	1	-	1	-	-	-	4
Conn.	8	-	3	-	-	2	4	-	-	2	4	-	-	-	-
MID. ATLANTIC	17	-	-	-	-	68	51	1	32	4	79	40	-	2	3
Upstate N.Y.	9	-	-	-	-	18	22	1	12	3	29	16	-	-	2
N.Y. City	2	-	-	-	-	21	3	-	-	-	-	3	-	-	-
N.J.	3	-	-	-	-	29	7	-	1	-	11	15	-	1	1
Pa.	3	-	-	-	-	-	19	-	19	1	39	6	-	1	-
E.N. CENTRAL	12	-	-	-	-	4	73	2	62	12	77	22	-	-	5
Ohio	4	-	-	-	-	3	22	2	26	9	57	3	-	-	-
Ind.	3	-	-	-	-	-	16	-	-	2	9	6	-	-	-
Ill.	3	-	-	-	-	-	23	-	17	-	4	5	-	-	5
Mich.	2	-	-	-	-	-	11	-	19	1	6	1	-	-	-
Wis.	-	-	-	-	-	1	1	-	-	-	1	7	-	-	-
W.N. CENTRAL	1	-	-	-	-	3	24	1	11	1	19	16	-	1	1
Minn.	-	-	-	-	-	3	2	-	-	-	-	2	-	-	-
Iowa	1	-	-	-	-	-	3	-	2	-	-	1	-	-	-
Mo.	-	-	-	-	-	-	9	1	6	-	8	8	-	1	-
N. Dak.	-	-	-	-	-	-	-	-	3	-	1	2	-	-	-
S. Dak.	-	-	-	-	-	-	2	-	-	-	1	1	-	-	-
Nebr.	-	-	-	-	-	-	-	-	-	-	3	2	-	-	-
Kans.	-	-	-	-	-	-	8	-	-	1	6	-	-	-	1
S. ATLANTIC	28	-	8	-	2	32	91	1	38	3	24	26	-	1	3
Del.	1	-	-	-	-	-	1	-	1	-	-	-	-	-	-
Md.	5	-	-	-	1	3	7	-	16	1	15	10	-	-	-
D.C.	5	-	-	-	-	-	4	-	-	-	-	-	-	-	1
Va.	2	-	-	-	1	5	7	1	10	1	2	2	-	-	-
W. Va.	-	-	-	-	-	-	2	-	2	-	1	-	-	-	-
N.C.	9	-	-	-	-	3	14	-	-	-	-	6	-	-	-
S.C.	-	-	-	-	-	-	10	-	1	-	-	6	-	-	-
Ga.	2	-	-	-	-	-	32	-	-	-	3	-	-	-	-
Fla.	4	-	8	-	-	21	14	-	8	1	3	2	-	1	2
E.S. CENTRAL	3	-	-	-	-	129	33	3	12	4	17	1	-	-	-
Ky.	-	-	-	-	-	113	6	-	-	-	3	-	-	-	-
Tenn.	-	-	-	-	-	-	11	3	7	4	9	-	-	-	-
Ala.	2	-	-	-	-	-	11	-	5	-	5	1	-	-	-
Miss.	1	-	-	-	-	16	5	-	-	-	-	-	-	-	-
W.S. CENTRAL	4	-	1	-	-	62	28	7	44	-	7	8	-	1	-
Ark.	1	-	-	-	-	-	2	1	3	-	-	3	-	-	-
La.	-	-	1	-	-	-	5	-	5	-	-	-	-	-	-
Okla.	1	-	-	-	-	-	3	-	2	-	7	5	-	1	-
Tex.	2	-	-	-	-	62	18	6	34	-	-	-	-	-	-
MOUNTAIN	6	-	3	-	-	1	42	1	27	3	32	27	-	2	-
Mont.	1	-	-	-	-	-	4	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	1	-	3	1	5	4	-	1	-
Wyo.	-	-	-	-	-	1	1	1	1	-	1	-	-	-	-
Colo.	3	-	2	-	-	-	5	-	4	-	11	12	-	-	-
N. Mex.	2	-	-	-	-	-	2	N	N	1	12	8	-	-	-
Ariz.	-	-	1	-	-	-	28	-	13	1	3	-	-	-	-
Utah	-	-	-	-	-	-	1	-	3	-	-	3	-	1	-
Nev.	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
PACIFIC	40	2	8	1	1	33	88	3	52	2	76	57	-	8	14
Wash.	2	-	-	-	-	7	12	-	6	-	5	7	-	-	-
Oreg.	2	-	-	-	-	-	11	N	N	-	-	4	-	1	-
Calif.	35	-	2	-	-	17	58	3	39	2	66	44	-	4	14
Alaska	-	-	-	-	-	9	4	-	2	-	1	-	-	1	-
Hawaii	1	2	6	1§	1	-	3	-	5	-	4	2	-	2	-
Guam	-	U	-	U	-	4	-	U	2	U	-	-	U	-	-
P.R.	-	-	37	-	-	30	3	-	-	-	-	2	-	-	-
V.I.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Amer. Samoa	-	U	1	U	-	-	-	U	-	U	-	-	U	-	-
C.N.M.I.	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-

*For measles only, imported cases include both out-of-state and international importations.
N: Not notifiable U: Unavailable † International § Out-of-state

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending March 13, 1993, and March 7, 1992 (10th Week)

Reporting Area	Syphilis (Primary & Secondary)		Toxic-Shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993
UNITED STATES	5,345	6,387	47	2,566	2,950	11	56	20	1,089
NEW ENGLAND	85	142	5	29	26	-	7	2	220
Maine	2	-	-	3	-	-	-	-	-
N.H.	2	9	1	-	-	-	-	-	5
Vt.	-	-	-	-	-	-	-	-	4
Mass.	45	60	4	6	23	-	5	2	62
R.I.	2	9	-	-	-	-	-	-	-
Conn.	34	64	-	20	3	-	2	-	149
MID. ATLANTIC	384	880	9	545	739	-	6	2	384
Upstate N.Y.	46	56	5	30	104	-	2	-	275
N.Y. City	249	459	-	361	400	-	2	-	-
N.J.	73	133	-	80	109	-	1	2	73
Pa.	16	232	4	74	126	-	1	-	36
E.N. CENTRAL	785	864	14	327	336	2	5	-	4
Ohio	241	105	9	44	63	-	2	-	-
Ind.	77	43	1	33	30	1	1	-	-
Ill.	266	373	-	175	156	-	1	-	-
Mich.	135	190	4	62	77	1	1	-	-
Wis.	66	153	-	13	10	-	-	-	4
W.N. CENTRAL	293	209	4	40	75	2	-	-	62
Minn.	14	16	1	-	26	-	-	-	13
Iowa	21	4	2	5	6	-	-	-	8
Mo.	233	157	-	22	28	1	-	-	1
N. Dak.	-	1	-	-	2	-	-	-	13
S. Dak.	-	-	-	4	6	-	-	-	4
Nebr.	-	1	-	2	1	-	-	-	1
Kans.	25	30	1	7	6	1	-	-	22
S. ATLANTIC	1,542	1,540	6	344	575	-	8	2	301
Del.	24	42	-	-	9	-	-	-	30
Md.	78	148	-	63	54	-	2	-	85
D.C.	164	106	-	21	26	-	-	-	3
Va.	119	123	-	-	77	-	1	-	62
W. Va.	6	3	-	10	15	-	-	-	9
N.C.	437	448	2	73	72	-	-	2	7
S.C.	163	249	-	51	55	-	-	-	22
Ga.	261	421	-	126	114	-	1	-	83
Fla.	290	-	4	-	153	-	4	-	-
E.S. CENTRAL	680	933	1	173	199	3	1	3	14
Ky.	57	26	-	54	62	-	-	2	1
Tenn.	182	194	1	-	-	2	-	-	-
Ala.	172	473	-	93	75	1	1	-	13
Miss.	269	240	-	26	62	-	-	1	-
W.S. CENTRAL	1,298	948	-	177	203	2	1	11	56
Ark.	170	136	-	16	19	1	-	-	2
La.	482	473	-	-	7	-	1	-	-
Okla.	72	55	-	9	25	-	-	11	11
Tex.	574	284	-	152	152	1	-	-	43
MOUNTAIN	47	109	2	66	72	-	1	-	12
Mont.	-	2	-	-	-	-	-	-	2
Idaho	-	1	-	-	6	-	-	-	-
Wyo.	1	-	-	-	-	-	-	-	2
Colo.	18	20	1	-	5	-	-	-	-
N. Mex.	10	11	-	-	14	-	-	-	2
Ariz.	18	40	-	44	25	-	1	-	6
Utah	-	1	1	8	6	-	-	-	-
Nev.	-	34	-	14	16	-	-	-	-
PACIFIC	231	762	6	865	725	2	27	-	36
Wash.	11	23	-	42	37	-	-	-	-
Oreg.	14	12	-	10	8	-	-	-	-
Calif.	205	724	6	759	622	2	25	-	28
Alaska	-	-	-	3	15	-	-	-	8
Hawaii	1	3	-	51	43	-	2	-	-
Guam	-	1	-	1	10	-	-	-	-
P.R.	101	24	-	-	24	-	-	-	12
V.I.	11	11	-	2	1	-	-	-	-
Amer. Samoa	-	-	-	1	-	-	-	-	-
C.N.M.I.	-	1	-	1	4	-	-	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending March 13, 1993 (10th Week)

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	848	639	126	56	12	15	100
Boston, Mass.	227	155	40	19	5	8	42
Bridgeport, Conn.	64	53	8	1	1	1	7
Cambridge, Mass.	22	16	5	1	-	-	3
Fall River, Mass.	34	27	5	1	1	-	6
Hartford, Conn.	75	51	14	9	1	-	1
Lowell, Mass.	33	25	5	3	-	-	1
Lynn, Mass.	18	14	3	1	-	-	1
New Bedford, Mass.	51	49	2	-	-	-	-
New Haven, Conn.	57	43	9	4	1	-	6
Providence, R.I.	64	40	13	9	1	1	10
Somerville, Mass.	7	6	-	1	-	-	2
Springfield, Mass.	56	49	6	1	-	-	4
Waterbury, Conn.	40	34	4	1	1	-	3
Worcester, Mass.	100	77	12	5	1	5	14
MID. ATLANTIC	2,817	1,888	516	272	57	84	195
Albany, N.Y.	69	55	7	3	2	2	5
Allentown, Pa.	33	28	3	2	-	-	1
Buffalo, N.Y.	100	73	20	2	1	4	2
Camden, N.J.	43	28	9	4	2	-	-
Elizabeth, N.J.	35	23	9	3	-	-	6
Erie, Pa.§	42	33	6	2	-	1	3
Jersey City, N.J.	67	40	14	11	-	2	2
New York City, N.Y.	1,567	1,034	286	185	32	30	91
Newark, N.J.	83	37	20	17	4	5	21
Paterson, N.J.	31	15	7	5	2	2	2
Philadelphia, Pa.	222	121	46	19	7	29	13
Pittsburgh, Pa.§	111	78	23	4	4	2	12
Reading, Pa.	8	5	2	1	-	-	1
Rochester, N.Y.	157	125	23	4	2	3	16
Schenectady, N.Y.	29	23	5	1	-	-	3
Scranton, Pa.§	25	20	5	-	-	-	3
Syracuse, N.Y.	86	60	23	3	-	-	3
Trenton, N.J.	42	34	2	2	1	3	2
Utica, N.Y.	23	20	1	2	-	-	1
Yonkers, N.Y.	44	36	5	2	-	1	8
E.N. CENTRAL	2,214	1,431	432	203	113	35	140
Akron, Ohio	71	52	10	4	4	1	-
Canton, Ohio	33	18	10	3	2	-	4
Chicago, Ill.	468	207	96	99	60	6	15
Cincinnati, Ohio	129	93	24	9	2	1	9
Cleveland, Ohio	158	92	42	15	6	3	4
Columbus, Ohio	U	U	U	U	U	U	U
Dayton, Ohio	144	112	27	4	1	-	12
Detroit, Mich.	255	149	63	27	12	4	10
Evansville, Ind.	54	43	8	1	1	1	4
Fort Wayne, Ind.	73	53	11	-	6	3	7
Gary, Ind.	19	6	6	3	4	-	-
Grand Rapids, Mich.	91	74	10	3	2	2	14
Indianapolis, Ind.	172	124	26	14	3	5	18
Madison, Wis.	35	26	6	1	-	2	6
Milwaukee, Wis.	161	111	35	10	3	2	8
Peoria, Ill.	53	35	11	4	2	1	4
Rockford, Ill.	54	41	9	1	3	-	5
South Bend, Ind.	61	45	11	4	-	1	8
Toledo, Ohio	114	89	21	-	2	2	12
Youngstown, Ohio	69	61	6	1	-	1	-
W.N. CENTRAL	807	587	132	46	20	22	67
Des Moines, Iowa	59	44	7	4	3	1	7
Duluth, Minn.	27	22	2	1	1	1	-
Kansas City, Kans.	48	34	9	4	-	1	1
Kansas City, Mo.	128	85	27	9	3	4	3
Lincoln, Nebr.	33	26	6	1	-	-	4
Minneapolis, Minn.	143	112	11	11	2	7	12
Omaha, Nebr.	77	51	16	3	4	3	6
St. Louis, Mo.	135	97	24	5	5	4	24
St. Paul, Minn.	81	62	13	5	1	-	6
Wichita, Kans.	76	54	17	3	1	1	4
S. ATLANTIC	1,396	877	260	165	46	41	87
Atlanta, Ga.	192	106	45	29	2	10	10
Baltimore, Md.	364	219	62	53	16	14	33
Charlotte, N.C.	103	67	24	9	3	-	3
Jacksonville, Fla.	117	79	19	8	6	4	6
Miami, Fla.	114	67	19	19	7	2	2
Norfolk, Va.	63	38	12	8	3	2	3
Richmond, Va.	90	60	14	11	3	-	5
Savannah, Ga.	71	50	13	4	1	3	4
St. Petersburg, Fla.	74	57	10	3	1	3	4
Tampa, Fla.	183	119	37	18	4	3	13
Washington, D.C.	U	U	U	U	U	U	U
Wilmington, Del.	25	15	5	3	-	-	4
E.S. CENTRAL	882	605	177	52	26	22	84
Birmingham, Ala.	105	56	27	10	7	5	3
Chattanooga, Tenn.	44	34	7	1	1	1	1
Knoxville, Tenn.	89	68	14	3	1	3	12
Lexington, Ky.	100	66	22	7	2	3	15
Memphis, Tenn.	249	170	41	18	11	9	30
Mobile, Ala.	85	65	18	1	-	1	10
Montgomery, Ala.	60	42	15	2	1	-	1
Nashville, Tenn.	150	104	33	10	3	-	12
W.S. CENTRAL	1,696	1,065	338	177	67	49	110
Austin, Tex.	68	42	13	9	3	1	5
Baton Rouge, La.	65	47	13	3	2	-	5
Corpus Christi, Tex.	50	31	14	3	-	2	1
Dallas, Tex.	269	160	49	38	14	8	16
El Paso, Tex.	76	53	9	9	3	2	4
Ft. Worth, Tex.	117	69	28	12	6	2	6
Houston, Tex.	350	190	82	50	19	9	32
Little Rock, Ark.	91	50	17	8	4	12	8
New Orleans, La.	193	133	33	17	6	4	-
San Antonio, Tex.	196	140	35	16	4	1	13
Shreveport, La.	97	63	20	5	4	5	9
Tulsa, Okla.	124	87	25	7	2	3	11
MOUNTAIN	867	583	157	81	27	18	74
Albuquerque, N.M.	105	80	11	8	5	1	4
Colo. Springs, Colo.	61	46	7	3	4	1	11
Denver, Colo.	94	61	19	9	1	4	11
Las Vegas, Nev.	180	110	46	20	3	-	10
Ogden, Utah	27	21	3	3	-	-	1
Phoenix, Ariz.	173	108	34	17	6	8	21
Pueblo, Colo.	21	15	4	2	-	-	2
Salt Lake City, Utah	91	61	11	12	5	2	7
Tucson, Ariz.	115	81	22	7	3	2	7
PACIFIC	2,370	1,563	404	258	74	59	152
Berkeley, Calif.	16	9	4	2	1	-	2
Fresno, Calif.	120	71	24	11	7	7	7
Glendale, Calif.	28	23	2	1	1	-	3
Honolulu, Hawaii	78	48	18	10	-	2	8
Long Beach, Calif.	96	62	17	11	2	4	7
Los Angeles, Calif.	652	399	113	92	30	8	28
Pasadena, Calif.	27	18	4	5	-	-	2
Portland, Oreg.	179	124	28	17	4	6	11
Sacramento, Calif.	194	140	23	19	9	3	20
San Diego, Calif.	194	119	37	25	6	7	15
San Francisco, Calif.	193	124	31	26	5	6	4
San Jose, Calif.	197	139	40	10	-	8	16
Santa Cruz, Calif.	46	36	8	1	-	1	6
Seattle, Wash.	191	128	29	21	7	6	11
Spokane, Wash.	57	44	11	2	-	-	7
Tacoma, Wash.	102	79	15	5	2	1	5
TOTAL	13,897¶	9,238	2,542	1,310	442	345	1,009

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

†Pneumonia and influenza.

§Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

¶Total includes unknown ages.

U: Unavailable.

Chronic Fatigue Syndrome — Continued

characteristic of a spumavirus. For the 29 case-patients and controls from New Jersey, samples were sent to laboratory A only; samples from all other case-patients and controls were sent to both laboratories A and B.

Previous retroviral tests performed at laboratory A (using their original PCR assay) were positive for all CFS case-patients from New Jersey. Other previous retroviral tests (performed at the research laboratory that reported finding an association between retroviral infection and CFS [*2*]) were positive for the 15 case-patients from New York. Of the 10 case-patients from North Carolina, six had been tested previously for retroviral infection; of these, four were positive.

None of the three assays could differentiate between case-patients and controls in either the combined study population or any of the individual study populations (Table 1). Both the original PCR assay from laboratory A and the cell-culture assay from laboratory B were positive for 59% and nearly 50%, respectively, of the case-patients and controls. The modified assay from laboratory A was negative for nearly all the case-patients (90%) and controls (96%).

Reported by: WJ Gunn, PhD, Arlington Associates, Lilburn, Georgia. AL Komaroff, MD, Brigham and Women's Hospital, DS Bell, MD, Harvard Univ Medical School, Boston; DB Connell, PhD, Abt Associates, Cambridge, Massachusetts. SM Levine, MD, Beth Israel Hospital, New York City. PR Cheney, MD, Cheney Clinic, Charlotte, North Carolina. Div of Viral and Rickettsial Diseases, National Center for Infectious Diseases, CDC.

Editorial Note: CFS has emerged as an important social and public health issue in the United States (*3*). Many of the complexities associated with this issue relate to diagnosis and reflect the inability of investigators to identify pathognomonic findings for CFS. In particular, CFS is primarily diagnosed by identifying specific symptoms reported by the patient and by excluding other potential causes of prolonged fatigue (*3*).

TABLE 1. Results of retroviral testing of chronic fatigue syndrome case-patients and controls — four study populations, 1992

		% Positive, by assay		
		Laboratory A		Laboratory B
Study population	Sample size	Polymerase chain reaction, original	Polymerase chain reaction, modified	Culture for foamy cell cytopathic effect
New Jersey				
Cases	29	52%	0	*
Controls	29	59%	0	*
New Jersey				
Cases	14	57%	0	50%
Controls	14	71%	0	43%
New York				
Cases	15	60%	6%	40%
Controls	15	53%	6%	60%
North Carolina				
Cases	10	80%	10%	50%
Controls	10	50%	0	40%
Total population				
Cases	**68**	**59%**	**3%**	**46%†**
Controls	**68**	**59%**	**1%**	**49%†**

*Not tested; these specimens were not sent to laboratory B.
†n=39.

Chronic Fatigue Syndrome — Continued

In April 1991, researchers reported finding nucleic acid sequences suggesting the presence of an HTLV-II-like retrovirus in lymphocytes of persons with CFS but not in healthy controls (*2*). Evidence suggesting the presence of a spumavirus—a retrovirus subfamily—in specimens from CFS patients also was reported in 1991 (*3*). These and other reports suggesting that retroviral infection might be associated with CFS have prompted investigations by institutions and have resulted in the use of retroviral testing to evaluate patients for CFS. Despite these efforts, the suggested association of retroviral infection with CFS has not been confirmed.

The study described in this report is the first controlled, blinded trial to examine the ability of these retroviral tests (i.e., PCR assay, PCR modified assay, and culture for foamy cell cytopathic effect) to distinguish CFS case-patients from controls. The findings from this study do not support the hypothesized association between infection with retroviruses and CFS and are consistent with findings from other studies assessing evidence of retroviral infection (*5–10*).

Although previously unidentified retroviral agents might be etiologic factors or cofactors for CFS, no scientific basis exists for the use of retroviral testing to confirm the diagnosis of CFS. Diagnostic testing of patients with suspected CFS should be done solely to exclude other diagnoses (*11*).

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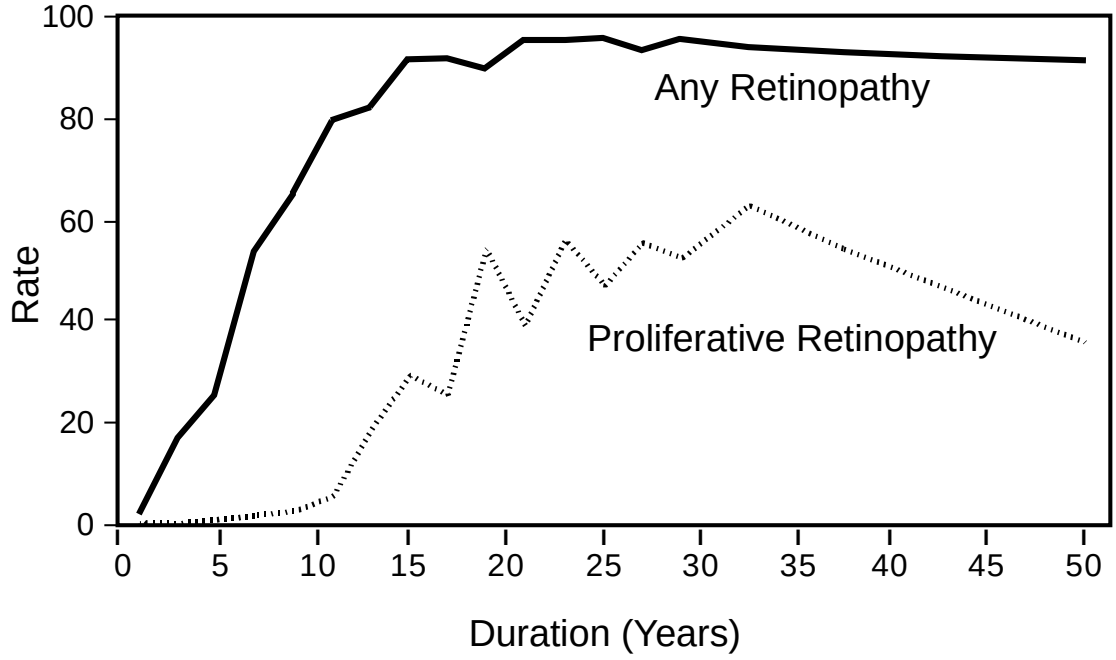
Effectiveness in Disease and Injury Prevention

Public Health Focus: Prevention of Blindness Associated with Diabetic Retinopathy

Each year in the United States, as many as 40,000 new cases of blindness occur among persons with diabetes (CDC, unpublished data, 1993). Diabetes is the leading cause of new blindness among U.S. adults aged 20–74 years (*1*). In addition, persons with diabetes are 25 times more likely than the general population to become blind. Most of this blindness in persons with diabetes results from diabetic retinopathy, a disorder characterized by microvascular changes and hemorrhage in the retina. Seven million persons in the United States have diabetes, and diabetic retinopathy will affect the majority during their lifetimes. This report summarizes information regarding the efficacy, effectiveness, and cost-effectiveness of screening for diabetic retinopathy.

The National Diabetes Data Group recognizes two major types of diabetes: insulin-dependent diabetes mellitus (IDDM) and noninsulin-dependent diabetes mellitus (NIDDM). Retinopathy occurs most frequently and severely among persons with IDDM (Figure 1), who represent approximately 5%–10% of all persons with diabetes (*2*). The prevalence of any diabetic retinopathy in this group is low immediately after diagnosis but increases to more than 90% after 15 years. The prevalence of proliferative diabetic retinopathy among persons with IDDM is negligible until 5 years' duration and increases to approximately 60% after 20 years. Among persons with IDDM, the prevalence of clinically significant macular edema (CSME) increases from less than 5% at short durations following diagnosis to more than 20% at 25 years' duration.

FIGURE 1. Prevalence* of retinopathy in persons with insulin-dependent diabetes mellitus, by duration of diabetes — Wisconsin Epidemiological Study of Diabetic Retinopathy, 1980–1982



*Rate per 100 persons with insulin-dependent diabetes mellitus.
Source: Reference 2. Adapted with permission.

Diabetic Retinopathy — Continued

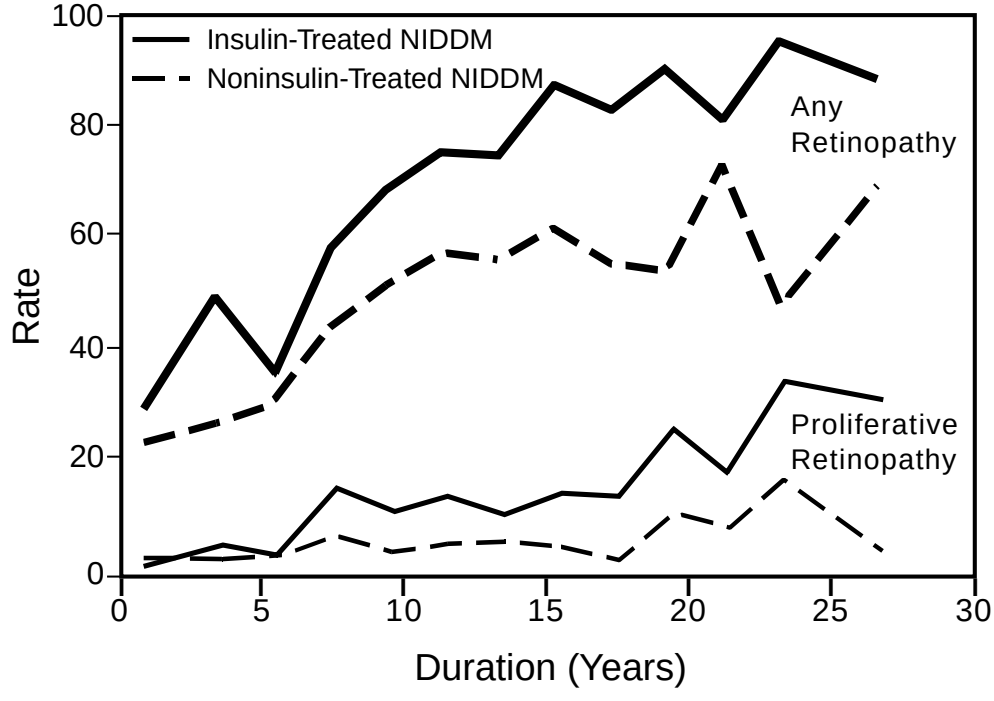
Approximately one third of all persons with NIDDM have insulin-treated diabetes. The prevalence of any retinopathy among persons with insulin-treated NIDDM steadily increases from 10%–30% at initial diagnosis to 90% at 25 years' duration (Figure 2); the prevalence of proliferative diabetic retinopathy increases from 2% at the time of diagnosis to approximately 20% after 20 years' duration. The prevalence of CSME is negligible at short durations following diagnosis but increases to more than 10% after 25 years.

Approximately half of all persons with diabetes have NIDDM treated by diet or oral hypoglycemic agents. The prevalence of any retinopathy among persons with noninsulin-treated NIDDM increases from 10%–20% at diagnosis to more than 60% at 20 years' duration. The prevalence of proliferative diabetic retinopathy increases from 2% at diagnosis to approximately 5% after 20 years' duration (Figure 2). The incidence and rate of progression of retinopathy are lowest among persons in this group. The prevalence of CSME in this group increases from less than 3% at short durations following diagnosis to more than 10% after 25 years.

Efficacy/Effectiveness

Prospective clinical trials indicate that laser photocoagulation therapy is effective in reducing the risk of visual impairment (*3,4*). Panretinal laser photocoagulation can reduce the risk of severe visual loss by at least 60% in some persons with diabetes (*5*). An annual eye examination can identify diabetic retinopathy early and permit timely treatment to prevent loss of vision and possible blindness (*6*). However, about half of

FIGURE 2. Prevalence* of retinopathy in persons with noninsulin-dependent diabetes mellitus (NIDDM), by duration of diabetes — Wisconsin Epidemiological Study of Diabetic Retinopathy, 1980–1982



*Rate per 100 persons with noninsulin-dependent diabetes mellitus (NIDDM).
Source: Reference 2. Adapted with permission.

Diabetic Retinopathy — Continued

persons with diabetes had not had a dilated eye examination in the preceding year (*7*).

Efficacy of Screening

The sensitivity of ophthalmoscopy in screening to identify diabetic retinopathy increases with the health-care provider's training and experience in performing eye examinations (*8*). Sensitivity of ophthalmoscopy performed by ophthalmologists, optometrists, trained ophthalmic technicians, and other health-care providers ranges from 50%–100% (*9,10*).

Retinal photography is a standard technique for examining eyes that have been pharmacologically (mydriatically) dilated or physiologically (nonmydriatically) dilated. Seven-field stereo retinal photography is both 100% sensitive and specific for diagnosing diabetic retinopathy and is the standard for evaluating severity of retinopathy in clinical trials and epidemiologic studies. Because stereo retinal photography is labor-intensive and expensive, other modes for screening have been tested and compared. Both mydriatic and nonmydriatic retinal photography, using wider angle lenses and fewer fields, have tested favorably.

Cost-Effectiveness of Screening

For working-aged persons in the United States (i.e., persons aged 21–64 years), the federal budgetary cost of one person-year of blindness has been estimated at $11,896 (*11*). Economic evaluations indicate that screening for diabetic retinopathy costs less than the cost of one person-year of blindness. Findings from one study (*12*) indicate that biannual and annual screening programs for persons with IDDM and NIDDM are cost-effective. Specifically, this study evaluated the cost-effectiveness of annual or biannual screening using three different diagnostic strategies (i.e., ophthalmoscopy and retinal photography with and without dilation) (Table 1). Each of the six strategies was compared with the baseline costs and consequences of the natural disease progression. The impact of treatment with laser and vitrectomy was added to natural progression as part of the modeling. A limitation of this study was that the model did not include the incidental benefits of detecting and treating cataract, glaucoma, and macular edema.

A second study evaluated the cost-effectiveness of different screening protocols for diabetic retinopathy among persons with IDDM (*13*) and focused on the effectiveness of eye examinations at three (6-, 12-, and 24-month) intervals, with and without the performance of seven-field stereo retinal photography. Assumptions included a sight-year cost of $6300 (based on Social Security data), an annual cost of $3150 for sight loss associated with macular edema, and an average age at onset of 12.5 years. Based on these assumptions, and by varying the strategies, $62 million–$109 million and 71,000–85,000 sight-years would be saved annually in the United States.

Reported by: Div of Diabetes Translation, National Center for Chronic Disease Prevention and Health Promotion, CDC.

Editorial Note: The findings in this report indicate that screening for diabetic retinopathy is both effective for preventing blindness and cost-effective. This prevention effort requires improvements in timeliness of screening, case-finding, and entry into the health-care system. To initiate treatment, all persons with diabetes (except those with IDDM of less than 5 years' duration) should receive an annual dilated eye exami-

Diabetic Retinopathy — Continued

TABLE 1. Projected costs and benefits of annual screening strategies for three 1000-person cohorts* followed more than 60 years†

Program strategy	Total sight-years	Sight-years gained	Total costs	Marginal costs§
Younger-onset cohort with ≥5 years of diabetes				
Natural disease progression (no care)	11,481	0	$5,610,634	0
Annual ophthalmoscopic screening	11,784	303	$4,513,870	($1,096,765)
Annual nonmydriatic camera photographic screening	11,795	314	$4,574,381	($1,036,253)
Annual mydriatic camera photographic screening	11,800	319	$4,589,565	($1,021,069)
Older-onset cohort taking insulin				
Natural disease progression (no care)	6,893	0	$1,714,690	0
Annual ophthalmoscopic screening	6,950	58	$1,657,795	($56,895)
Annual nonmydriatic camera photographic screening	6,954	61	$1,723,279	$8,589
Annual mydriatic camera photographic screening	6,956	62	$1,747,539	$32,849
Older-onset cohort not taking insulin				
Natural disease progression (no care)	6,708	0	$ 869,550	0
Annual ophthalmoscopic screening	6,727	19	$ 896,821	$27,270
Annual nonmydriatic camera photographic screening	6,728	20	$ 972,224	$102,674
Annual mydriatic camera photographic screening	6,729	21	$1,006,900	$137,350

*For each cohort, the strategies are ordered in increasing effectiveness as measured by sight-years gained.
†The columns labeled "sight-years gained" and "marginal costs" refer to the difference between sight-year totals and cost totals and costs reported for natural disease progression (no care) for each cohort.
§Cost-savings are shown in parentheses. Costs not in parentheses represent net expenditures.

nation performed by a trained provider and should receive appropriate referral and treatment.

To reduce blindness associated with diabetic retinopathy, public health and clinical health-care providers must identify and treat high-risk persons before loss of vision. Diabetes-control programs are effective in identifying and treating persons at high risk for vision loss (*14*). Tertiary prevention in the form of laser treatment for proliferative diabetic retinopathy and macular edema is available in all states and most areas. Ongoing investigations are assessing whether effective control of hyperglycemia will ensure secondary prevention of diabetic retinopathy and blindness.

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Diabetic Retinopathy — Continued

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