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Epidemiologic Notes and Reports

Locally Acquired Neurocysticercosis — North Carolina, Massachusetts, and South Carolina, 1989–1991

From October 1989 through November 1991, three persons with neurocysticercosis acquired in the eastern United States (North Carolina, Massachusetts, and South Carolina) were reported to CDC. This report summarizes clinical and epidemiologic information for these cases.

Patient 1. On October 4, 1989, a previously healthy man residing in New Jersey had a syncopal episode while at work. Although physical examination was normal, magnetic resonance imaging (MRI) at a New York City hospital revealed multiple (>20) cystic lesions throughout the brain. A serum specimen was positive for cysticercosis by immunoblot assay. The patient was asymptomatic on anticonvulsant medication until June 1991, when left-sided hemiparesis and weakness were noted. In July, he was treated with albendazole (10 mg/kg per day for 28 days) administered with dexamethasone. His condition improved, and he remains asymptomatic.

The patient was born and raised on a farm in North Carolina and had moved to New Jersey in July 1989; he had never traveled outside the United States. Although there was no family history of neurologic illness or tapeworm infection, some of the workers who were hired seasonally to assist on the farm had immigrated from countries with endemic cysticercosis.

Patient 2. On August 26, 1990, a 16-month-old girl in Boston had a seizure. Cranial contrast-enhanced computerized axial tomographic (CAT) scan showed ring-enhancing lesions in the left parietal and frontal cortex and a solid right parietal lesion. The immunoblot assay for cysticercosis was positive in both serum and cerebrospinal fluid. Stool examination for ova and parasites showed *Giardia*. The patient was treated with metronidazole for giardiasis, but no specific anthelminthic medication was given. In November 1989, the lesions were resolving, and the patient remains asymptomatic on anticonvulsants.

The patient had always resided in Boston and had never traveled out of Massachusetts. Her parents had emigrated from the Cape Verde Islands 18 months before

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her birth. Although no immediate family members had been acutely ill, serum specimens obtained from three of four family members were positive for cysticercosis in the immunoblot assay. Stool specimens obtained from the patient's father contained eggs of *Taenia* sp. All family members were treated with a taeniacidal dose of niclosamide.

Patient 3. In February 1990, a previously healthy girl in South Carolina developed generalized seizures. A CAT scan revealed a single contrast-enhancing right parietal lesion consistent with a tumor. Biopsy of the lesion showed nonspecific inflammation. In May, follow-up examination by MRI demonstrated a recurrence of the lesion, which was resected. The lesion was identified as a cysticercus (larval cyst) of *Taenia solium*. The patient remains asymptomatic on anticonvulsant medication.

The patient lived in Laurens County, South Carolina, and had never traveled out of state. To identify the source of the infection and possible additional persons with neurocysticercosis, the Upper Savannah District of the South Carolina Department of Health and Environmental Control conducted interviews and voluntary diagnostic tests among 26 family members and contacts. None of these persons had traveled outside the United States or eaten uncooked pork, and none reported previous tapeworm infections, subcutaneous nodules, seizures, or other neurologic symptoms. Serum specimens from all 26 persons were negative in the immunoblot assay for cysticercosis. One contact, a neighbor who had immigrated from Mexico, was seronegative, and the one stool specimen obtained from him was negative for eggs and proglottids of *Taenia* sp. However, the health department obtained serum specimens from five of the neighbor's friends who also had immigrated from Mexico and who often stayed in the neighbor's residence (often visited by the patient), of which three were positive for cysticercosis by immunoblot assay. One of the seronegative persons reported a history of tapeworm infection several years previously. All five refused stool examination for intestinal parasites.

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Editorial Note: Neurocysticercosis is infection of the central nervous system with the tissue-invading larval stages (cysticerci) of the pork tapeworm *T. solium*. Cysticercosis is acquired by ingesting tapeworm eggs shed in human feces, not by ingesting pork (Figure 1). Although cysticerci may localize throughout the body, most clinical manifestations are related to their presence in the central nervous system, where they can invade parenchyma, the subarachnoid spaces, and the ventricular system, causing seizures, hydrocephalus, and other neurologic dysfunction (*1*).

Cysticercosis is widely endemic in rural areas of Latin America, Asia, and Africa. During the 1980s, however, neurocysticercosis has been increasingly recognized in the United States through improved brain imaging by CAT and MRI. Most cases have been diagnosed in the western states among immigrants from areas with endemic cysticercosis (*2–4*). In addition, from 1988 through 1990, 7.3% of 138 cases reported to the Los Angeles Department of Health Services were acquired locally (i.e., in patients born in the United States who had not traveled to foreign countries with

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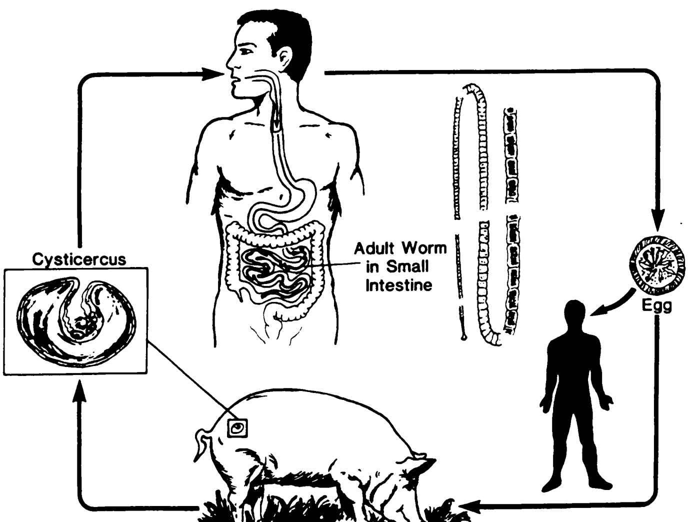
endemic cysticercosis). Epidemiologic investigation of these cases identified as possible sources of infection household contact with persons who had imported tapeworm infections (*5*).

Because none of the patients in this report had traveled outside the United States, they could not have acquired their infections in areas of known endemic cysticercosis. Moreover, because *T. solium* cysticercosis is virtually unknown in swine in the United States (*6*), transmission through the pig-human cycle was unlikely. The highly variable and usually prolonged (i.e., >1 year) incubation period of neurocysticercosis has complicated attempts to identify sources for individual infections; however, the investigations suggest two of these patients may have been infected from household (fecal-oral) exposure to persons with imported tapeworm infections. This explanation is supported by the demonstration of *Taenia* sp. eggs in the stools of the father of patient 2 and the history of previous tapeworm infection and demonstration of antibodies to *T. solium* in the immigrants who were household contacts of patient 3. Although the source of infection for patient 1 is less clear, infection may have been associated with exposure to migrant laborers employed for seasonal farm work; in 1987, a survey for intestinal parasites in migrant workers in North Carolina determined that *Taenia* sp. were present in stool specimens obtained from 3% of persons of Central American origin (S. Ciesielski, Ph.D., J.R. Seed, Ph.D., University of North Carolina School of Public Health, personal communication, 1991).

In the United States, sewage disposal systems are adequate to prevent transmission of helminths that require a period of soil incubation to become infective. Thus, helminth infections among immigrant populations in the United States are not

FIGURE 1. Life cycle of *Taenia solium*



The two-host life cycle of *T. solium* involves humans as definitive hosts for the intestinal stage adult tapeworm that is acquired by eating undercooked pork contaminated with cysticerci. Swine, the intermediate host, become infected with the larval stage by ingesting eggs shed in the feces of a human tapeworm carrier. Humans may inadvertently acquire larval-stage infection through the fecal-oral route.

Neurocysticercosis — Continued

considered a major public health problem. However, in contrast to most helminth parasites, the eggs of *T. solium* are immediately infectious when passed in the stool and may be transmitted directly by person-to-person contact. Intestinal *T. solium* infections may persist for many years, and substantial numbers of infective eggs can be passed in the host's stools; eggs have been recovered from fingernail dirt, skin, and clothes of carriers (*7*).

Patients with cysticercosis and their household and other personal contacts should be screened for tapeworm infection since treatment with a single dose of niclosamide or praziquantel will eradicate the tapeworm (*8*) and remove a potential source of transmission. Consideration should be given to screening persons at high risk for *T. solium* infections for intestinal parasites if those persons are to be employed as food handlers or housekeepers. Persons having household or other close contact (i.e., contact that exposes them to inadvertent infection through the fecal-oral route) with a person with a documented tapeworm should be screened for cysticercosis by medical history and serologic testing; if such an assessment suggests cysticercosis, neurologic examination and brain scan is advised.

Clinical manifestations of neurocysticercosis are varied, nonspecific, and related to the number and location of lesions (*1*). A heightened index of suspicion is a critical first step in establishing the diagnosis; the most sensitive and specific diagnostic tool is brain imaging by CAT or MRI. The diagnosis can be confirmed serologically using the recently developed enzyme-linked immunoelectrotransfer blot (*9*) that is 100% specific and highly sensitive for persons with multiple intracranial lesions. Although the assay is less sensitive for infected persons having solitary cysts, serologic testing may obviate the need for invasive biopsy. While cysts often resolve without anthelminthic treatment, praziquantel or albendazole is effective in persons with serious clinical manifestations and viable cysts (*10*).

In most states—including the eastern United States—cysticercosis is not a reportable condition. However, the cases described in this report suggest local transmission has occurred in diverse locations in the United States. Cases of cysticercosis may be reported to CDC's Division of Parasitic Diseases, National Center for Infectious Diseases, through state and local health departments.

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Current Trends

Surgeon General's Conference on Agricultural Safety and Health, 1991

On April 30–May 3, 1991, CDC's National Institute for Occupational Safety and Health (NIOSH) convened the Surgeon General's Conference on Agricultural Safety and Health in Des Moines, Iowa. The theme for this conference was "FarmSafe 2000: A National Coalition for Local Action." Agricultural safety and health professionals, equipment manufacturers, farmer and migrant health organizations, rural health-care professionals, and agricultural youth organizations met to deliberate on methods to reduce health and safety risks in agriculture. More than 700 persons attended and represented 41 states and Puerto Rico. Through small-group interactive discussions, the conference addressed surveillance, research, and intervention—three public health activities necessary to meet year 2000 national health objectives (*1*). This report summarizes the issues considered at the conference and recommendations proposed by attendees.

Surveillance

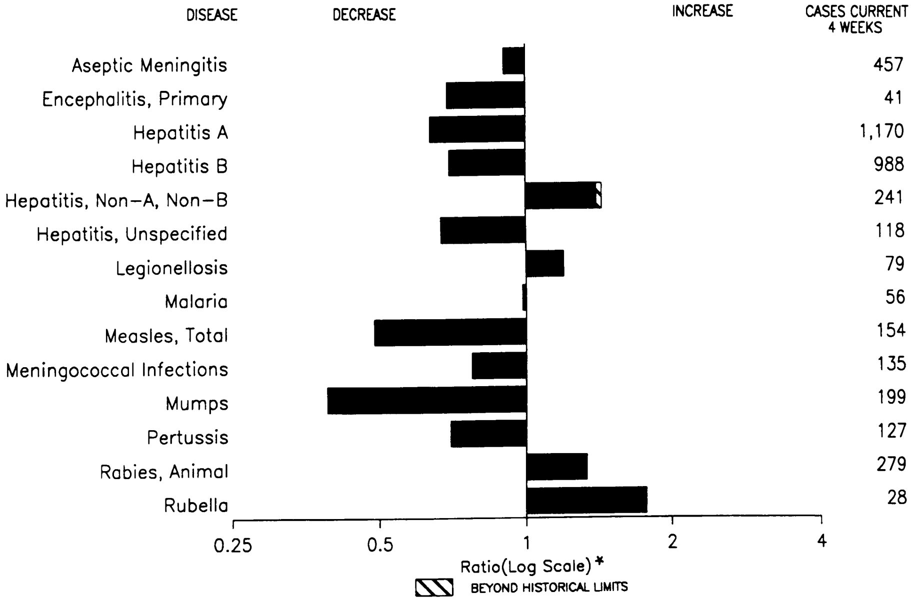
- Government, industry, communities, and individuals should collaborate to develop agricultural surveillance programs to both recognize problems and delineate their scope.
- Potential initial targets for surveillance include fatal injury, amputation, eye injury, skin cancer, repetitive trauma, acute pesticide poisoning, hearing loss, and respiratory conditions.
- Surveillance efforts should include use of compiled data to set priorities for intervention efforts (e.g., installation of roll-over-protective-structures [ROPS] to prevent fatalities from tractor roll-overs), followed by rapid evaluation of the efficacy of these interventions.
- Approaches warranting further assessment include surveillance by local health and safety practitioners, promulgation of surveillance case definitions by health and safety experts, and coding of death certificates for industry and occupation.

Research

- To improve understanding of the etiology of agriculture-related disease and injury, risk factors should be better characterized, and specific physical, chemical, and biologic health hazards should be identified.
- Research efforts are needed to address the effects of combined exposures and repeated acute exposures on chronic diseases, inadvertent injection of biologic or infectious agents through needlestick injuries, and immunosuppression associated with exposures to chemical and biologic agents.
- The safety and health problems of special populations (e.g., migrant workers, children, and women) and regional patterns of injury and disease should be studied epidemiologically.
- Research efforts should focus on intervention strategy alternatives (e.g., education, regulation, and engineering controls), protective technology, the efficacy of standards, and the role of personal actions.

(Continued on page 11)

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending January 4, 1992, with historical data — United States



*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 the hatched 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 January 4, 1992 (1st Week)

	Cum. 1992		Cum. 1992
AIDS	944	Measles: imported	-
Anthrax	-	indigenous	-
Botulism: Foodborne	-	Plague	-
Infant	-	Poliomyelitis, Paralytic*	-
Other	-	Psittacosis	-
Brucellosis	1	Rabies, human	-
Cholera	-	Syphilis, primary & secondary	705
Congenital rubella syndrome	-	Syphilis, congenital, age < 1 year	-
Diphtheria	-	Tetanus	-
Encephalitis, post-infectious	-	Toxic shock syndrome	3
Gonorrhea	4,705	Trichinosis	3
Haemophilus influenzae (invasive disease)	7	Tuberculosis	324
Hansen Disease	-	Tularemia	1
Leptospirosis	-	Typhoid fever	3
Lyme Disease	20	Typhus fever, tickborne (RMSF)	-

*Nine suspected cases of poliomyelitis have been reported in 1991; 4 of the 8 suspected cases in 1990 were confirmed, and all were vaccine associated.

TABLE II. Cases of selected notifiable diseases, United States, weeks ending January 4, 1992, and January 5, 1991 (1st Week)

Reporting Area	AIDS	Aseptic Menin-gitis	Encephalitis		Gonorrhea		Hepatitis (Viral), by type				Legionel-losis	Lyme Disease
			Primary	Post-in-fectious			A	B	NA,NB	Unspeci-fied		
	Cum. 1992	Cum. 1992	Cum. 1992	Cum. 1992	Cum. 1992	Cum. 1991	Cum. 1992	Cum. 1992	Cum. 1992	Cum. 1992	Cum. 1992	Cum. 1992
UNITED STATES	944	59	5	-	4,705	6,986	136	79	10	1	11	20
NEW ENGLAND	7	32	-	-	77	387	3	10	-	-	1	4
Maine	-	-	-	-	-	-	-	-	-	-	-	-
N.H.	6	-	-	-	-	4	1	2	-	-	1	-
Vt.	-	-	-	-	-	2	-	-	-	-	-	-
Mass.	-	1	-	-	65	99	2	7	-	-	-	1
R.I.	-	31	-	-	12	14	-	1	-	-	-	3
Conn.	1	-	-	-	-	268	-	-	-	-	-	-
MID. ATLANTIC	170	2	-	-	292	317	-	2	2	-	-	5
Upstate N.Y.	41	-	-	-	-	-	-	-	-	-	-	-
N.Y. City	4	-	-	-	-	-	-	-	-	-	-	-
N.J.	93	-	-	-	292	-	-	-	2	-	-	-
Pa.	32	2	-	-	-	317	-	2	-	-	-	5
E.N. CENTRAL	193	10	-	-	1,345	578	19	10	-	1	5	6
Ohio	33	6	-	-	952	-	11	2	-	-	5	6
Ind.	1	3	-	-	93	295	7	4	-	1	-	-
Ill.	140	-	-	-	151	-	-	-	-	-	-	-
Mich.	10	1	-	-	149	164	1	4	-	-	-	-
Wis.	9	-	-	-	-	119	-	-	-	-	-	-
W.N. CENTRAL	17	3	-	-	415	327	17	1	-	-	-	-
Minn.	15	-	-	-	-	14	-	-	-	-	-	-
Iowa	-	3	-	-	-	49	-	1	-	-	-	-
Mo.	2	-	-	-	381	179	-	-	-	-	-	-
N. Dak.	-	-	-	-	-	-	-	-	-	-	-	-
S. Dak.	-	-	-	-	1	2	16	-	-	-	-	-
Nebr.	-	-	-	-	33	82	-	-	-	-	-	-
Kans.	-	-	-	-	-	1	1	-	-	-	-	-
S. ATLANTIC	378	3	-	-	822	2,842	1	4	1	-	2	-
Del.	-	-	-	-	13	23	-	1	-	-	-	-
Md.	97	-	-	-	95	237	-	-	-	-	-	-
D.C.	30	-	-	-	150	213	-	1	-	-	-	-
Va.	3	-	-	-	275	-	-	-	-	-	-	-
W. Va.	-	-	-	-	20	42	1	1	-	-	-	-
N.C.	50	3	-	-	-	610	-	1	1	-	-	-
S.C.	-	-	-	-	263	210	-	-	-	-	2	-
Ga.	-	-	-	-	-	811	-	-	-	-	-	-
Fla.	198	-	-	-	6	696	-	-	-	-	-	-
E.S. CENTRAL	61	-	-	-	327	825	-	4	-	-	1	-
Ky.	1	-	-	-	38	74	-	4	-	-	1	-
Tenn.	12	-	-	-	-	207	-	-	-	-	-	-
Ala.	48	-	-	-	96	290	-	-	-	-	-	-
Miss.	-	-	-	-	193	254	-	-	-	-	-	-
W.S. CENTRAL	68	-	-	-	768	596	-	-	-	-	-	-
Ark.	13	-	-	-	104	132	-	-	-	-	-	-
La.	5	-	-	-	202	125	-	-	-	-	-	-
Okla.	-	-	-	-	-	85	-	-	-	-	-	-
Tex.	50	-	-	-	462	254	-	-	-	-	-	-
MOUNTAIN	9	-	-	-	177	218	3	1	1	-	-	-
Mont.	1	-	-	-	2	-	1	1	-	-	-	-
Idaho	-	-	-	-	-	-	-	-	-	-	-	-
Wyo.	-	-	-	-	-	2	-	-	-	-	-	-
Colo.	-	-	-	-	-	33	1	-	1	-	-	-
N. Mex.	8	-	-	-	11	9	-	-	-	-	-	-
Ariz.	-	-	-	-	108	128	-	-	-	-	-	-
Utah	-	-	-	-	-	9	-	-	-	-	-	-
Nev.	-	-	-	-	56	37	1	-	-	-	-	-
PACIFIC	41	9	5	-	482	896	93	47	6	-	2	5
Wash.	-	-	-	-	-	157	4	7	2	-	2	-
Oreg.	-	-	-	-	16	21	-	-	-	-	-	-
Calif.	31	9	5	-	444	694	88	40	4	-	-	5
Alaska	-	-	-	-	-	7	-	-	-	-	-	-
Hawaii	10	-	-	-	22	17	1	-	-	-	-	-
Guam	-	-	-	-	-	-	-	-	-	-	-	-
P.R.	-	1	-	-	-	-	-	1	-	-	-	-
V.I.	-	-	-	-	-	-	-	-	-	-	-	-
Amer. Samoa	-	-	-	-	-	-	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	-	2	-	-	-	-	-	-

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

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending January 4, 1992, and January 5, 1991 (1st Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1992	1992	Cum. 1992	1992	Cum. 1992	Cum. 1991	Cum. 1992	1992	Cum. 1992	1992	Cum. 1992	Cum. 1991	1992	Cum. 1992	Cum. 1991
UNITED STATES	5	-	-	-	-	74	22	12	12	2	2	39	1	1	1
NEW ENGLAND	-	-	-	-	-	-	2	-	-	-	-	6	-	-	-
Maine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N.H.	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-
Vt.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Mass.	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
R.I.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conn.	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
MID. ATLANTIC	2	-	-	-	-	51	2	-	-	-	-	-	-	-	-
Upstate N.Y.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N.Y. City	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N.J.	1	-	-	-	-	9	-	-	-	-	-	-	-	-	-
Pa.	1	-	-	-	-	42	2	-	-	-	-	-	-	-	-
E.N. CENTRAL	-	-	-	-	-	-	4	5	5	-	-	18	-	-	1
Ohio	-	-	-	-	-	-	-	5	5	-	-	4	-	-	-
Ind.	-	-	-	-	-	-	3	-	-	-	-	9	-	-	1
Ill.	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-
Mich.	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
Wis.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W.N. CENTRAL	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Minn.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iowa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mo.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
N. Dak.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S. Dak.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Nebr.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kans.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S. ATLANTIC	-	-	-	-	-	-	2	2	2	-	-	-	-	-	-
Del.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Md.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D.C.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Va.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W. Va.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N.C.	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
S.C.	-	-	-	-	-	-	1	2	2	-	-	-	-	-	-
Ga.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fla.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E.S. CENTRAL	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
Ky.	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Tenn.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Ala.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Miss.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W.S. CENTRAL	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Ark.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
La.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Okla.	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
Tex.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOUNTAIN	-	-	-	-	-	2	2	2	2	-	-	3	-	-	-
Mont.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wyo.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colo.	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
N. Mex.	-	-	-	-	-	-	-	N	N	-	-	-	-	-	-
Ariz.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Utah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nev.	-	-	-	-	-	2	2	2	2	-	-	-	-	-	-
PACIFIC	3	-	-	-	-	21	9	3	3	2	2	8	1	1	-
Wash.	2	-	-	-	-	-	4	1	1	-	-	-	-	-	-
Oreg.	-	-	-	-	-	-	-	N	N	-	-	-	-	-	-
Calif.	-	-	-	-	-	21	5	2	2	2	2	3	1	1	-
Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawaii	1	-	-	-	-	-	-	-	-	-	-	5	-	-	-
Guam	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
P.R.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V.I.	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
Amer. Samoa	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
C.N.M.I.	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-

*For measles only, imported cases includes 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 January 4, 1992, and January 5, 1991 (1st Week)

Reporting Area	Syphilis (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1992	Cum. 1991	Cum. 1992	Cum. 1992	Cum. 1991	Cum. 1992	Cum. 1992	Cum. 1992	Cum. 1992
UNITED STATES	705	535	3	324	258	1	3	-	16
NEW ENGLAND	1	21	2	79	5	-	-	-	-
Maine	-	-	-	-	-	-	-	-	-
N.H.	-	-	1	-	-	-	-	-	-
Vt.	-	-	-	-	-	-	-	-	-
Mass.	-	14	1	79	-	-	-	-	-
R.I.	1	-	-	-	1	-	-	-	-
Conn.	-	7	-	-	4	-	-	-	-
MID. ATLANTIC	6	139	-	41	35	-	1	-	-
Upstate N.Y.	-	-	-	-	-	-	-	-	-
N.Y. City	-	57	-	41	33	-	-	-	-
N.J.	6	31	-	-	2	-	1	-	-
Pa.	-	51	-	-	-	-	-	-	-
E.N. CENTRAL	76	24	-	-	17	-	-	-	-
Ohio	16	-	-	-	-	-	-	-	-
Ind.	1	6	-	-	1	-	-	-	-
Ill.	1	-	-	-	16	-	-	-	-
Mich.	58	6	-	-	-	-	-	-	-
Wis.	-	12	-	-	-	-	-	-	-
W.N. CENTRAL	13	10	-	1	7	-	-	-	4
Minn.	-	2	-	-	-	-	-	-	2
Iowa	-	-	-	1	3	-	-	-	2
Mo.	12	7	-	-	-	-	-	-	-
N. Dak.	-	-	-	-	3	-	-	-	-
S. Dak.	-	-	-	-	-	-	-	-	-
Nebr.	1	-	-	-	-	-	-	-	-
Kans.	-	1	-	-	1	-	-	-	-
S. ATLANTIC	380	154	1	32	8	-	-	-	6
Del.	1	2	-	-	-	-	-	-	2
Md.	179	15	-	28	-	-	-	-	2
D.C.	44	24	-	-	3	-	-	-	-
Va.	9	-	-	-	-	-	-	-	-
W. Va.	-	-	-	3	2	-	-	-	2
N.C.	20	10	1	-	-	-	-	-	-
S.C.	8	6	-	1	3	-	-	-	-
Ga.	-	30	-	-	-	-	-	-	-
Fla.	119	67	-	-	-	-	-	-	-
E.S. CENTRAL	41	38	-	4	35	1	-	-	-
Ky.	-	-	-	-	-	1	-	-	-
Tenn.	-	-	-	-	-	-	-	-	-
Ala.	12	20	-	-	9	-	-	-	-
Miss.	29	18	-	4	26	-	-	-	-
W.S. CENTRAL	153	66	-	-	-	-	-	-	-
Ark.	-	6	-	-	-	-	-	-	-
La.	39	55	-	-	-	-	-	-	-
Okla.	-	-	-	-	-	-	-	-	-
Tex.	114	5	-	-	-	-	-	-	-
MOUNTAIN	26	17	-	4	28	-	-	-	1
Mont.	-	-	-	-	-	-	-	-	1
Idaho	-	-	-	-	-	-	-	-	-
Wyo.	-	1	-	-	-	-	-	-	-
Colo.	-	1	-	-	6	-	-	-	-
N. Mex.	-	-	-	-	-	-	-	-	-
Ariz.	5	15	-	-	12	-	-	-	-
Utah	-	-	-	-	10	-	-	-	-
Nev.	21	-	-	4	-	-	-	-	-
PACIFIC	9	66	-	163	123	-	2	-	5
Wash.	-	4	-	2	-	-	-	-	-
Oreg.	1	-	-	-	-	-	-	-	-
Calif.	8	62	-	160	122	-	2	-	5
Alaska	-	-	-	-	-	-	-	-	-
Hawaii	-	-	-	1	1	-	-	-	-
Guam	-	-	-	-	-	-	-	-	-
P.R.	-	-	-	-	-	-	-	-	-
V.I.	-	-	-	-	-	-	-	-	-
Amer. Samoa	-	-	-	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	-	-	-	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending January 4, 1992 (1st Week)

Reporting Area	All Causes, By Age (Years)						P&I†
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	751	564	114	41	13	19	68
Boston, Mass.	199	126	41	18	7	7	12
Bridgeport, Conn.	50	36	8	4	1	1	4
Cambridge, Mass.	29	23	3	3	-	-	3
Fall River, Mass.	26	22	3	1	-	-	1
Hartford, Conn.	75	62	10	2	-	1	7
Lowell, Mass.	40	34	5	-	-	1	2
Lynn, Mass.	22	19	2	1	-	-	2
New Bedford, Mass.	26	23	3	-	-	-	1
New Haven, Conn.	54	40	7	2	3	2	3
Providence, R.I.	43	38	3	1	1	-	7
Somerville, Mass.	8	7	-	1	-	-	-
Springfield, Mass.	55	35	12	5	1	2	5
Waterbury, Conn.	40	33	6	1	-	-	7
Worcester, Mass.	84	66	11	2	-	5	14
MID. ATLANTIC	2,636	1,766	462	288	68	50	170
Albany, N.Y.	65	44	13	4	2	2	3
Allentown, Pa.	31	24	5	1	1	-	4
Buffalo, N.Y.	107	77	20	5	4	1	7
Camden, N.J.	34	21	7	3	1	2	6
Elizabeth, N.J.	22	13	5	4	-	-	-
Erie, Pa.§	56	47	6	1	1	1	6
Jersey City, N.J.	52	31	7	8	6	-	1
New York City, N.Y.	1,431	920	247	199	37	28	75
Newark, N.J.	68	28	17	16	2	3	6
Paterson, N.J.	24	11	11	1	1	-	-
Philadelphia, Pa.	198	131	31	24	6	6	8
Pittsburgh, Pa.§	72	50	14	4	2	2	7
Reading, Pa.	48	42	5	1	-	-	10
Rochester, N.Y.	136	109	21	4	1	1	14
Schenectady, N.Y.	40	31	6	2	1	-	2
Scranton, Pa.§	47	36	9	2	-	-	6
Syracuse, N.Y.	101	79	13	4	3	2	8
Trenton, N.J.	44	27	13	3	-	1	3
Utica, N.Y.	24	19	5	-	-	-	1
Yonkers, N.Y.	36	26	7	2	-	1	3
E.N. CENTRAL	2,277	1,481	408	233	116	39	162
Akron, Ohio	47	34	7	6	-	-	8
Canton, Ohio	38	34	4	-	-	-	3
Chicago, Ill.	601	267	129	119	76	10	29
Cincinnati, Ohio	105	71	19	8	4	3	14
Cleveland, Ohio	143	92	35	9	4	3	3
Columbus, Ohio	196	140	34	16	3	3	11
Dayton, Ohio	123	97	15	8	2	1	13
Detroit, Mich.	208	133	42	20	9	4	8
Evansville, Ind.	62	53	6	2	-	1	1
Fort Wayne, Ind.	49	36	9	2	2	-	2
Gary, Ind.	U	U	U	U	U	U	U
Grand Rapids, Mich.	111	82	13	11	4	1	16
Indianapolis, Ind.	105	67	14	17	5	2	5
Madison, Wis.	U	U	U	U	U	U	U
Milwaukee, Wis.	157	128	17	6	1	5	19
Peoria, Ill.	45	28	14	2	-	1	3
Rockford, Ill.	75	58	10	1	4	2	11
South Bend, Ind.	61	51	7	2	1	-	7
Toledo, Ohio	99	70	23	3	1	2	5
Youngstown, Ohio	52	40	10	1	-	1	4
W.N. CENTRAL	609	447	105	32	11	14	43
Des Moines, Iowa	85	62	15	4	3	1	5
Duluth, Minn.	60	50	8	-	1	1	3
Kansas City, Kans.	37	26	6	3	1	1	-
Kansas City, Mo.	104	72	19	10	1	2	4
Lincoln, Nebr.	28	17	10	1	-	-	7
Minneapolis, Minn.	123	91	18	8	2	4	10
Omaha, Nebr.	81	63	11	4	2	1	9
St. Louis, Mo.	U	U	U	U	U	U	U
St. Paul, Minn.	56	46	7	-	1	2	4
Wichita, Kans.	35	20	11	2	-	2	1
S. ATLANTIC	1,019	645	206	102	37	29	64
Atlanta, Ga.	159	90	34	23	9	3	8
Baltimore, Md.	121	72	28	12	4	5	10
Charlotte, N.C.	95	61	24	5	1	4	6
Jacksonville, Fla.	132	88	24	13	6	1	12
Miami, Fla.	72	38	17	11	3	3	-
Norfolk, Va.	52	29	11	7	2	3	5
Richmond, Va.	96	63	17	9	6	1	8
Savannah, Ga.	45	27	9	3	2	4	2
St. Petersburg, Fla.	49	38	4	3	1	3	1
Tampa, Fla.	170	118	33	14	3	2	12
Washington, D.C.	U	U	U	U	U	U	U
Wilmington, Del.	28	21	5	2	-	-	-
E.S. CENTRAL	624	409	133	52	15	15	58
Birmingham, Ala.	75	53	15	3	1	3	6
Chattanooga, Tenn.	45	36	5	2	1	1	2
Knoxville, Tenn.	57	25	18	10	2	2	3
Louisville, Ky.	71	51	15	3	-	2	5
Memphis, Tenn.	165	104	38	15	6	2	13
Mobile, Ala.	68	50	10	4	1	3	16
Montgomery, Ala.	51	34	9	5	1	2	1
Nashville, Tenn.	92	56	23	10	3	-	12
W.S. CENTRAL	1,207	708	260	141	64	34	68
Austin, Tex.	61	41	10	8	1	1	5
Baton Rouge, La.	14	10	4	-	-	-	-
Corpus Christi, Tex.	37	20	8	6	3	-	1
Dallas, Tex.	226	129	49	34	10	4	3
El Paso, Tex.	66	46	15	2	2	1	2
Ft. Worth, Tex.	92	58	17	5	7	5	4
Houston, Tex.	342	157	101	56	17	11	32
Little Rock, Ark.	62	45	11	3	2	1	3
New Orleans, La.	68	34	6	15	13	-	-
San Antonio, Tex.	128	85	22	9	7	5	7
Shreveport, La.	9	6	-	1	1	1	2
Tulsa, Okla.	102	77	17	2	1	5	9
MOUNTAIN	826	541	162	67	26	30	63
Albuquerque, N.M.	89	62	17	5	3	2	6
Colo. Springs, Colo.	54	34	8	3	4	5	12
Denver, Colo.	132	88	20	11	4	9	16
Las Vegas, Nev.	164	100	40	17	5	2	7
Ogden, Utah	29	22	2	3	-	2	2
Phoenix, Ariz.	184	121	40	15	3	5	11
Pueblo, Colo.	29	21	7	-	1	-	2
Salt Lake City, Utah	43	22	11	3	3	4	4
Tucson, Ariz.	102	71	17	10	3	1	3
PACIFIC	1,586	1,085	281	149	34	29	144
Berkeley, Calif.	13	9	3	1	-	-	-
Fresno, Calif.	112	69	27	8	-	8	12
Glendale, Calif.	21	16	1	2	2	-	1
Honolulu, Hawaii	90	64	16	8	-	2	7
Long Beach, Calif.	101	74	16	9	1	1	17
Los Angeles, Calif.	337	200	61	50	12	6	15
Pasadena, Calif.	33	28	1	2	1	1	3
Portland, Oreg.	108	78	18	10	1	1	6
Sacramento, Calif.	178	132	26	11	7	2	19
San Diego, Calif.	99	60	22	12	-	5	14
San Francisco, Calif.	U	U	U	U	U	U	U
San Jose, Calif.	197	139	41	11	5	1	25
Santa Cruz, Calif.	40	32	5	3	-	-	13
Seattle, Wash.	122	78	24	16	3	1	2
Spokane, Wash.	51	40	8	2	-	1	8
Tacoma, Wash.	84	66	12	4	2	-	2
TOTAL	11,535¶	7,646	2,131	1,105	384	259	840

*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

Surgeon General's Conference — Continued

Intervention

- Preventive interventions exist to reduce risks for many vectorborne diseases (e.g., equine encephalitides and Lyme disease), exposures to agrichemicals and other potentially toxic agents, and acute trauma or chronic musculoskeletal disorders associated with agricultural equipment.
- Feasible approaches exist in three intervention categories: hazard elimination, passive controls, and behavioral changes.
  1. Hazard elimination approaches include equipment redesign (e.g., increasing tractor-seat flexibility to allow 360-degree observation of agricultural operations), job redesign (e.g., reducing repetitive lifting in dairy operations through use of overhead tracks to assist workers in moving bulky equipment during cow milking), and product substitutions (e.g., using smaller amounts and less toxic pesticides for pest management on farms).
  2. Passive controls eliminate the need for specific decisions or actions by workers. These include the use of ROPS on tractors, kill switches that shut off chain saws automatically when they recoil toward the operator, or closed pesticide-loading systems, which reduce exposures to potentially toxic substances.
  3. Behavioral changes (e.g., wearing personal protective equipment, applying insect repellents, or reading and heeding warning signs) can be promoted among workers and others in the farm community through education efforts. Successful adoption of behavioral changes depends on a variety of factors, including the characteristics of the target audiences (e.g., age, education level, and culture); the media and people used to reach target audiences; and linkages between local, state, and national coalitions.

Reported by: Div of Respiratory Disease Studies; Div of Safety Research; Div of Surveillance, Hazard Evaluations, and Field Studies; Office of the Director, National Institute for Occupational Safety and Health, CDC.

Editorial Note: The terms "agricultural population" and "agricultural worker" encompass several groups, including farm owners and their families; migrant and seasonal workers; agricultural service workers; and persons working in the forestry, logging, and commercial fishing sectors (*2*). Based on U.S. Department of Agriculture estimates, approximately 13.1 million persons in the United States derive some income from farming; in addition, 6 million persons are considered to be members of farm families. In 1989, approximately 3.4 million persons were full-time workers in agriculture (*3*).

Injury and disease associated with physical, chemical, and biologic hazards occur disproportionately among agricultural workers and their families. Although the agricultural industry employs only 2% of U.S. workers, it ranks fourth in both the number of work-related traumatic fatalities (accounting for 742 deaths annually) and the rate for occupational fatalities (20.7 fatalities per 100,000 workers) (*4*). Agricultural machinery, especially farm tractors, is a major cause of work-related death among agricultural workers; of the estimated 1500 machinery-related deaths occurring annually among all workers, more than half involve farm equipment (*5*). Surveillance data for 1985 indicate that racial/ethnic minorities were at particular risk for agricultural work-related fatal injury: the risk for work-related death among Hispanic and black agricultural workers was 20%–30% greater than among non-Hispanic whites; in addition, for all other minorities, the risk was twice as great as for non-Hispanic whites (*5*).

Surgeon General's Conference — Continued

In addition to work-related injury, agricultural workers are at substantial risk for occupational illness. In 1988, the agricultural sector had the second highest rate of occupational illnesses among the 10 industrial sectors (*6*). Moreover, agricultural workers are at increased risk for a variety of malignant and nonmalignant chronic diseases (*7*). For example, in 1988, agricultural workers ranked first in incidence of occupational skin disorders and sixth in work-related respiratory illnesses (*6*). Finally, work-related exposure to antibiotics, which may create selective pressures for development of more resistant strains of bacteria (*8*), and exposure of agricultural workers and farm family members to potentially hazardous noise levels (*7*) have been identified as problems in the agricultural sector.

The Surgeon General's conference identified prevention actions to reduce agriculture-related diseases and injuries and issues that must be addressed to assure actions can be implemented. Papers and proceedings from this conference will be published as will a Surgeon General's report on agricultural safety and health, which will propose prevention actions for reducing agriculture-related diseases and injuries and review current federal policies for protecting agricultural workers. The proceedings and the Surgeon General's report are available from The Agricultural Safety and Health Program, NIOSH, CDC, Mailstop D-26, 1600 Clifton Road, N.E., Atlanta, GA 30333 (fax [404] 639-2196).

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Topics in Minority Health

Hepatitis B and Injecting-Drug Use Among American Indians — Montana, 1989–1990

From November 1989 through March 1990, five cases of serologically confirmed acute hepatitis B (HB)* among American Indians from two Montana Indian reservations (combined population: 6300) were reported by Indian Health Service (IHS) clinic staff to the Billings IHS Area Office. In comparison, during 1986–1988, an average of six HB cases among American Indians were reported annually among persons residing both on reservations and statewide (1990 population of American Indians in Montana: 47,679). Four of the five persons with acute HB reported histories of injecting-drug use (IDU).

The IHS attempted to identify close contacts (i.e., household, sexual, and needle-sharing) of the five persons to provide counseling, HB serologic testing, and HB prophylaxis. Of 149 contacts identified, 84 provided blood for serologic testing. Of the 84, nine (11%) had serologically confirmed acute HB (eight with symptoms); three (for whom IgM antibody to HB core antigen [IgM anti-HBc] test results were not available) had symptoms of acute hepatitis, were HB surface antigen (HBsAg) positive, and were suspected to have acute HB. Two persons who were HBsAg positive but IgM anti-HBc negative were considered to be HB virus (HBV) carriers. Approximately half (70 [47%]) of the contacts interviewed reported IDU.

All of the 17 persons (five index patients and 12 contacts) with serologically confirmed or suspected acute HB were American Indians living on the two reservations. The median age of patients was 28 years (range: 9–45 years); 13 were male. Fifteen (88%) patients reported histories of IDU; of these, 10 reported sharing needles with one of the two asymptomatic HBV carriers. The predominant drugs of use were methamphetamine and cocaine, injected intravenously. One patient was the child of another patient who was an injecting-drug user. Sixteen persons with acute HB consented to be tested for antibody to human immunodeficiency virus (anti-HIV); none had detectable anti-HIV.

Susceptible contacts of HBV-infected patients were offered HB immune globulin (HBIG) and/or HB vaccination. In addition, all contacts were counseled (both in person and with brochures) about prevention of HBV and HIV transmission. Although no cases of acute HB were identified from April through June 1990, in July, acute HB occurred in two additional persons living on the reservation. One had been identified previously as a sexual contact of an earlier patient and had declined HBIG and HB vaccine. The other was also a sexual contact of an earlier patient but had not been identified as a contact during the initial investigation.

Reported by: R Harding, MN; SD Helgerson, MD, Billings Area Office, Indian Health Svc. T Damrow, PhD, State Epidemiologist, Montana Dept of Health and Environmental Sciences. Hepatitis Br, Div of Viral and Rickettsial Diseases, National Center for Infectious Diseases, CDC.

Editorial Note: HBV is transmitted most commonly and efficiently through percutaneous, sexual, and perinatal exposures (*1*). Transmission also can occur through inapparent percutaneous exposure, such as person-to-person transfer of infectious body fluids from skin lesions. In the Montana outbreak, most patients were injecting-drug users; several may have been infected through sexual contact, and one, a child, apparently acquired the disease through household exposure.

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*Positive for IgM antibody to HB core antigen.

Hepatitis B — Continued

HBV infection is relatively uncommon among American Indians in the contiguous United States; for example, seroprevalence rates of 1%–2% have been reported among the Navajo and Sioux (*2,3*). In comparison, the crude prevalence rate of HBV infection in the United States is approximately 5%, and up to 70% of Alaskan Eskimos (among whom HBV infection is endemic) in selected villages are infected with HBV (*4,5*). Although the extent of IDU among American Indians is not well known, among U.S. high school seniors, American Indians have self-reported higher rates of drug use than have other racial/ethnic groups (*6*).

This HB outbreak among injecting-drug users on reservations in Montana indicates that risk behaviors exist in certain American Indian communities and that these behaviors may facilitate the spread of HB and other bloodborne viruses. Control measures for HB include vaccination and education about methods to reduce the risk for transmission of bloodborne diseases. Vaccination efforts for injecting-drug users often are unsuccessful because of the difficulty of reaching this population and ensuring completion of all doses of vaccine; therefore, the Immunization Practices Advisory Committee has recommended universal infant vaccination with HB vaccine as part of a strategy to eliminate HBV transmission in the United States (*7*). In addition to vaccination, education efforts on prevention of the transmission of HBV and other bloodborne pathogens, including HIV and hepatitis C virus, should continue.

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Notices to Readers

Challenge of Multidrug-Resistant Tuberculosis

To address the rapidly changing character of tuberculosis (TB) and the recent outbreaks of multidrug-resistant TB, CDC is sponsoring a meeting on the subject January 22–23, 1992. The theme of the meeting is "The Challenge of Multidrug-Resistant Tuberculosis," and will be held at CDC; additional information is available from CDC's Surveillance and Epidemiologic Investigations Branch, Division of Tuberculosis Elimination, National Center for Prevention Services; telephone (404) 639-2519.

Notices to Readers — Continued

Seventh Annual Conference on Human Retrovirus Testing

On March 3–5, 1992, the Association of State and Territorial Public Health Laboratory Directors (ASTPHLD) will sponsor the Seventh Annual Conference on Human Retrovirus Testing in Chicago. The conference will emphasize laboratory testing for detection, treatment, progression, and control of retroviral diseases. The conference will include a workshop on flow cytometry on March 5. Additional information is available from ASTPHLD, Conference Registrar, 1211 Connecticut Ave., N.W., Suite 508, Washington, DC 20036; telephone (202) 822-5227.

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The data in the weekly *MMWR* are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday. Inquiries about the *MMWR* Series, including material to be considered for publication, should be directed to: Editor, *MMWR* Series, Mailstop C-08, Centers for Disease Control, Atlanta, GA 30333; telephone (404) 332-4555.

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