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Epidemiologic Notes and Reports

Transmission of Multidrug-Resistant Tuberculosis from an HIV-Positive Client in a Residential Substance-Abuse Treatment Facility — Michigan

In November 1989, a man with a history of intravenous (IV)-drug use first presented to the tuberculosis (TB) clinic of the Muskegon County (Michigan) Health Department (MCHD). The patient indicated that he had been treated for pulmonary TB in another city, and he produced for clinic staff his labeled medications, which included isoniazid (INH), rifampin (RIF), and ethambutol (EMB). The patient also stated that he was an IV-drug user (IVDU) and previously had tested positive for human immunodeficiency virus (HIV) infection. Sputum specimens for acid-fast bacilli (AFB) were obtained, and the patient was maintained on his anti-TB medications. His HIV-antibody status was confirmed.

The patient was living in a residential substance-abuse treatment facility in Michigan after moving from a large northeastern city. This treatment facility recruits persons from the northeast who have a history of IV-drug use and offers them a prescribed rehabilitation program of 1 year's duration; however, the facility's attrition rate is high, and no health screening program is in place at the facility.

One week after the initial visit, one of the sputum specimens was reported smear-positive for AFB. A follow-up chest radiograph of the patient revealed a pulmonary infiltrate with a cavitary lesion. Three weeks later, culture of the sputum specimen yielded *Mycobacterium tuberculosis* resistant to INH, RIF, and EMB. Subsequently, the patient's prior medical records arrived at the TB clinic, confirming his HIV status and his treatment for TB since March 1988; these records also indicated that *M. tuberculosis* isolated from his sputum previously had been resistant to INH. Because the patient could not be properly isolated in the residential facility, he was transferred to a hospital.

Because of concerns regarding the potential for TB transmission in the residential facility, the MCHD conducted a TB contact investigation in the facility. Its rehabilitation program involves close interaction among clients and staff. Clients are housed in a two-story building that contains several large, crowded dormitories for sleeping. Ventilation is provided by opening windows and doors, rather than through a central system, and heat is provided by steam radiators.

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Of the 160 clients and staff who were identified as contacts to the index patient, 146 were tuberculin skin tested with 5 tuberculin units of purified protein derivative (PPD) using the Mantoux technique. Of the 14 persons not tested, 10 had histories of tuberculin skin-test positivity, and four had left the facility. The skin tests were read at 48 hours for 140 of the tested persons (six residents did not return for reading). Of the 140 persons, 16 (11%) had reactions of ≥5 mm and were considered skin-test positive.

In March 1990, MCHD personnel returned for follow-up skin testing of 70 persons who were previously skin-test negative and were still present in the facility. Of these, 15 (21%) were positive (i.e., skin-test converters), 54 (77%) remained negative, and one (1%) person had left the facility before having his test read. Fourteen of those with documented skin-test conversions were residents of the facility, and one was a staff member.

Chest radiographs were obtained for all persons with a positive skin test, including those positive by history alone. Although no additional cases of clinical TB were identified, the investigation identified a total of 31 skin-test positive persons and a documented skin-test conversion rate of 22% (15/69 tested).

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Editorial Note: Even before the HIV epidemic, IVDUs were reported to be at high risk for developing TB (*1*). In IVDUs who are coinfected with HIV and *M. tuberculosis*, however, the risk of developing clinically active disease is substantially increased and may be as high as 7% per year (*2*). In several areas, HIV infection among IVDUs accounts for much of the HIV-associated increase in TB (*3,4*).

In Muskegon County, a patient with multidrug-resistant TB infected at least 15 and possibly as many as 31 persons. However, the number of skin-test converters identified in this investigation may underestimate the true number. Although the HIV-antibody status of residents of the substance-abuse facility was unknown, the clients were at high risk for HIV infection; HIV-related delayed type hypersensitivity (DTH) anergy may have decreased skin-test reactivity to PPD tuberculin (*5*). In addition, nearly half of the clients who were initially skin-test negative were not available for repeat evaluation.

Federal regulations require tuberculin skin testing of IVDUs before they are admitted to treatment programs (*6*). Given the substantial risk for TB and the potential for its prevention, substance-abuse programs should perform a skin test and record the diameter of induration on each new enrollee, as well as on persons who are already enrolled but have not been tested. Persons with a tuberculin skin test of ≥5 mm induration should be further evaluated for clinical TB and, if disease is present, treated according to current guidelines. If clinical disease is ruled out and exposure to drug-sensitive *M. tuberculosis* is assumed, known and suspected HIV-infected persons, regardless of age, with a tuberculin reaction of ≥5 mm should receive 12 months of INH preventive therapy, unless medically contraindicated; all HIV-seronegative IVDUs with a reaction of ≥10 mm should receive 6 months of INH (*7*). All consenting IVDUs and their sex partners should receive counseling and HIV-antibody testing (*8*).

Because of apparent PPD anergy among some asymptomatic persons with HIV infection, HIV-infected persons should be evaluated for DTH anergy in conjunction with PPD tuberculin testing. This recommendation is particularly important for persons at increased risk for tuberculous infection (e.g., recent contacts of a person with

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infectious TB). Companion testing with two DTH skin test antigens is recommended; mumps, *Candida*, and tetanus toxoid antigens administered by the Mantoux method are preferred. Guidelines for anergy testing in HIV-infected persons are being developed. Anergic HIV-seropositive persons who are known contacts of patients with infectious TB should be considered for preventive therapy once active TB has been ruled out.

The usual approach to managing persons recently infected with *M. tuberculosis* is to administer INH preventive therapy for 6–12 months (*9*). In Muskegon County, however, the infected contacts were presumably infected with organisms resistant to INH and RIF. No drug regimens have proven effective in preventing progression to disease in persons infected with multidrug-resistant TB. This outbreak and others (*10*) highlight the need for alternative preventive therapy regimens in such instances.

The findings from the investigation in this report underscore the needs to: 1) immediately isolate and treat institutionalized persons suspected of having infectious TB and rapidly initiate a contact investigation when the diagnosis of TB is first considered (e.g., sputum smear is positive for AFB), rather than when it is confirmed by identification of the organisms on culture (*11*); 2) suspect drug-resistant TB in a patient who remains sputum smear-positive despite therapy for >3 months; and 3) develop rapid diagnostic tests to identify *M. tuberculosis* and to perform drug-susceptibility studies (*12*). Finally, medical information about a patient who is under a health department's care and who relocates should be expeditiously communicated to the health department in the patient's new jurisdiction.

References

1. Reichman LB, Felton CP, Edsall JR. Drug dependence, a possible new risk factor for tuberculosis disease. Arch Intern Med 1979;139:337–9.
2. Selwyn PA, Hartel D, Lewis VA, et al. A prospective study of the risk of tuberculosis among intravenous drug users with human immunodeficiency virus infection. N Engl J Med 1989;320:545–50.
3. CDC. Tuberculosis and acquired immunodeficiency syndrome—New York City. MMWR 1987;36:785–90,795.
4. Sunderam G, McDonald RJ, Maniatis T, et al. Tuberculosis as a manifestation of the acquired immunodeficiency syndrome (AIDS). JAMA 1986;245:362–6.
5. Robert CF, Hirschel B, Rochat T, et al. Tuberculin skin reactivity in HIV-seropositive intravenous drug addicts [Letter]. N Engl J Med 1989;321:1268.
6. Food and Drug Administration/National Institute on Drug Abuse. Methadone in maintenance and detoxification; joint proposed revision of conditions for use; proposed rule. Federal Register 1987;52:37046–61. (21 CFR Part 291).
7. CDC. Tuberculosis and human immunodeficiency virus infection: recommendations of the Advisory Committee for the Elimination of Tuberculosis. MMWR 1989;38:236–8,243–50.
8. CDC. Public Health Service guidelines for counseling and antibody testing to prevent HIV infection and AIDS. MMWR 1987;36:509–15.
9. American Thoracic Society/CDC. Treatment of tuberculosis and tuberculosis infection in adults and children. Am Rev Respir Dis 1986;134:355–63.
10. CDC. Nosocomial transmission of multidrug-resistant TB to health-care workers and HIV-infected patients in an urban hospital—Florida. MMWR 1990;39:718–22.
11. CDC. Guidelines for preventing the transmission of tuberculosis in health-care settings, with special focus on HIV-related issues. MMWR 1990;39(no. RR-17).
12. Brisson-Noel A, Lecossier D, Nassif X, et al. Rapid diagnosis of tuberculosis by amplification of mycobacterial DNA in clinical samples. Lancet 1989;2:1069–71.

Human Rabies — Texas, 1990

On June 5, 1990, a 22-year-old man died of rabies encephalitis in Hidalgo County, Texas, along the Mexican border. This was the fourth case of human rabies known to be acquired in the United States since 1980 and the first case in Texas since 1985. This report summarizes the case investigation.

On April 13, the man was bitten on the right index finger by a bat while at a tavern in Mercedes, Texas. The patient did not obtain medical care for the bite; he remained well until May 30, when he complained of right hand weakness. On June 1, he complained of right arm numbness and dysesthesias. On June 2, he exhibited several episodes of staring and unresponsiveness lasting 10–15 seconds. He consulted a physician in Mexico, who prescribed an unknown medication. That evening he presented to a hospital emergency room in Texas complaining of right hand pain. Based on a history of a puncture wound with a catfish fin earlier in the week, he was treated with ceftriaxone and tetanus toxoid.

On June 3, when he returned to the emergency room complaining of "spasms," he was hyperventilating and had a white blood cell (WBC) count of 11,100 per mm^3. Although he was discharged after reporting some improvement, he subsequently had intermittent episodes of rigidity, breath holding, hallucinations, and difficulty in swallowing; eventually he refused liquids. That evening he was admitted to the intensive-care unit of another hospital in Texas with a preliminary diagnosis of either encephalitis or tetanus. Manifestations included frequent spasms of the face, mouth, and neck; stuttering speech; hyperventilation; and temperature of 100.1 F (37.8 C). The WBC count was 17,100 per mm^3 with a granulocytosis. He was sedated and observed.

On the morning of June 4, the patient was confused, disoriented, and areflexic. Although his neck was supple, muscle tonus was increased in his upper extremities. Analysis of cerebrospinal fluid (CSF) indicated slightly elevated protein (51 mg/dL; normal: 15–45 mg/dL); slightly elevated glucose; and 3 red blood cells and 1 WBC per dL. An electroencephalogram showed abnormal slow and alpha activity without focal abnormality. Because the patient had uncontrolled oral secretions, he was intubated. His temperature rose to 107 F (41.7 C), and he had marked diaphoresis. Later on June 4, the patient's supervisor from work reported the man's history of a bat bite to hospital authorities. CSF, serum, and skin biopsy (taken from the nape of the neck) samples were forwarded to CDC for rabies testing; all of these samples were negative. The patient became comatose and died on June 5. Postmortem samples of brain tissue were positive for rabies by the direct immunofluorescence antibody test. Monoclonal antibody typing suggested that the rabies variant was the Mexican free-tailed bat (*Tadarida braziliensis mexicana*) strain.

Although the period of rabies virus infectivity before onset of clinical symptoms (i.e., preclinical secretion of rabies virus) is probably only a few days, for the purpose of contact investigation for this case, public health authorities considered the 2 weeks before onset of the patient's symptoms to be the period of infectivity. Consequently, postexposure prophylaxis was initiated for 67 of 100 possibly exposed contacts among family, friends, coworkers, and medical personnel.

The patient had worked as a phlebotomist for a blood bank and had donated blood on May 22 before onset of symptoms. His platelets had been transfused before he became ill, but the remainder of his blood products were destroyed. Although rabies

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virus was not isolated from the patient's blood and he was probably not infectious when he donated, the platelet recipient received rabies immunoprophylaxis.

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Editorial Note: The primary types of animal exposures leading to human rabies in the United States have changed since 1950 (*1*), when most cases were acquired from domestic animals. From 1980 through 1990, 13 cases of human rabies in the United States were reported to CDC; four (30.8%) were acquired domestically.

Bat rabies occurs everywhere in the continental United States: during 1989, each of the 48 contiguous states and the District of Columbia reported infected bats. From 1980 through 1990, the number of reported infected bats peaked in 1984 with 1038. In 1989, California and Texas reported the highest number of infected bats (117 and 72, respectively). Rabies is enzootic in the Mexican free-tailed bat, the most important vector of rabies in the southwestern states; rabies isolation rates vary from 0.5% in apparently normal bats to >50% in clinically affected bats (*2*). In the southeastern and mid-Atlantic states, rabies is most prevalent in the migratory red bat.

Based on monoclonal antibody analysis and exposure history, three of the four cases of human rabies acquired within the United States from 1980 through 1990 resulted from exposure to bats. In general, postexposure prophylaxis should be initiated for persons exposed to vampire, frugivorous, and insectivorous bats; it may be discontinued if the bat is tested and found negative for rabies. In 1980 and 1981, 10% of persons who received rabies prophylaxis had been bitten by bats (*3*).

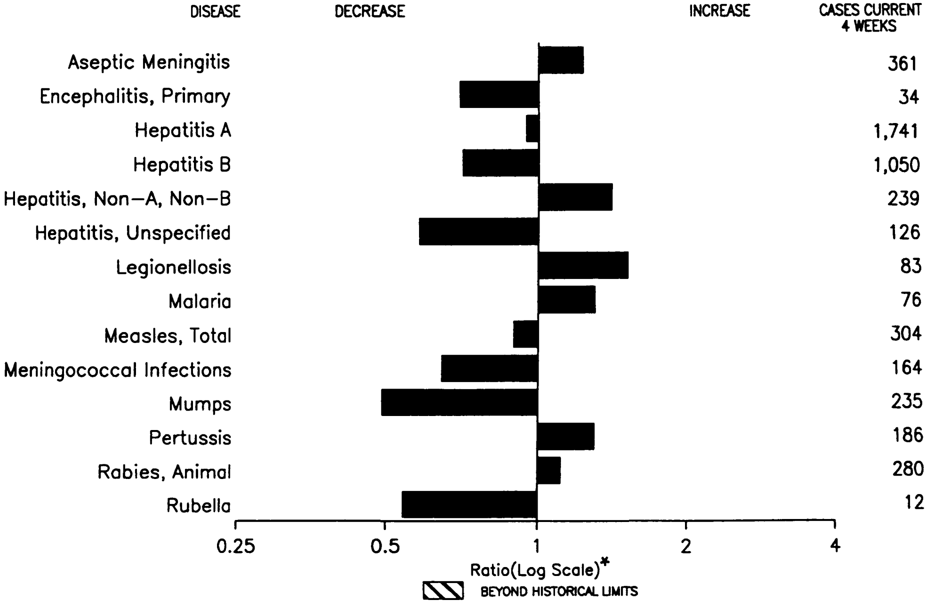
In addition to rabies virus, other causes of viral encephalitis in humans in the United States include herpes simplex, St. Louis encephalitis, eastern equine encephalitis, Venezuelan equine encephalitis, and La Crosse viruses (*4–6*). The most common clinical manifestation of viral encephalitis is acute onset of febrile illness with headache, fever, disorientation, behavioral and speech changes, and other neurologic signs. As this report indicates, diagnosis of central nervous system infections is difficult. Although definite exposure histories are sometimes absent, a history of an animal bite and a rapidly progressive encephalitis should prompt health-care providers to consider rabies in the differential diagnosis.

Human rabies can be prevented by avoiding contact with rabid animals. Most terrestrial mammals are susceptible to rabies virus infection. Contact should be avoided with all wild and domestic animals exhibiting atypical behavior. Family dogs and cats should be vaccinated against rabies. If human exposures do occur, immediate cleansing of the bite wound with soap and water is recommended. When possible, the biting animal should be captured and submitted for testing for rabies. Medical care should also be sought to assess the need for tetanus vaccination, general wound care, and rabies prophylaxis.

References

1. CDC. Rabies surveillance, United States, 1988. MMWR 1989;38(no. SS-1).
2. Constantine DG, Tierkel ES, Klecker MD, Hawkins DM. Rabies in New Mexico cavern bats. Public Health Rep 1968;83:303.
3. Hughes SS. The virus: a history of the concepts. New York: Science History Publications, 1977.
4. Whitely RJ. Viral encephalitis. N Engl J Med 1990;232:242–50.
5. Luby JP. St. Louis encephalitis. Epidemiol Rev 1979;1:55–73.
6. Shope RE. Epidemiology: mechanisms of cause, distribution, and transmission of viral disease. In: Fields BN, Knipe DM, Chanock RM, Melnick JL, Roizman B, Shope RE, eds. Virology. New York: Raven Press, 1985:145–51.

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending February 23, 1991, with historical data — United States



*Ratio of current 4-week total to the 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 February 23, 1991 (8th Week)

	Cum. 1991		Cum. 1991
AIDS	5,372	Measles: imported	14
Anthrax	-	indigenous	479
Botulism: Foodborne	-	Plague	-
Infant	9	Poliomyelitis, Paralytic*	-
Other	-	Psittacosis	8
Brucellosis	12	Rabies, human	-
Cholera	-	Syphilis, Primary & Secondary	6,275
Congenital rubella syndrome	3	Syphilis, congenital, age < 1 year	-
Diphtheria	1	Tetanus	-
Encephalitis, post-infectious	6	Toxic shock syndrome	62
Gonorrhea	81,280	Trichinosis	-
Haemophilus Influenzae (invasive disease)	368	Tuberculosis	2,558
Hansen Disease	13	Tularemia	4
Leptospirosis	12	Typhoid fever	48
Lyme Disease	71	Typhus fever, tickborne (RMSF)	13

*No cases of suspected poliomyelitis have been reported in 1991; none of the 6 suspected cases in 1990 have been confirmed to date. Five of the 13 suspected cases in 1989 were confirmed and all were vaccine associated.

TABLE II. Cases of selected notifiable diseases, United States, weeks ending February 23, 1991, and February 24, 1990 (8th Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea		Hepatitis (Viral), by type				Legionellosis	Lyme Disease
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1990	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991
UNITED STATES	5,372	711	67	6	81,280	104,657	3,471	1,995	470	209	159	71
NEW ENGLAND	287	35	5	-	2,974	3,009	88	141	22	5	19	14
Maine	15	2	2	-	17	38	4	1	1	-	-	-
N.H.	8	2	-	-	36	35	3	4	1	-	1	2
Vt.	7	1	-	-	12	11	4	1	-	-	-	-
Mass.	171	10	1	-	1,019	1,109	53	122	20	3	18	11
R.I.	9	19	-	-	153	152	14	7	-	2	-	1
Conn.	77	1	2	-	1,737	1,664	10	6	-	-	-	-
MID. ATLANTIC	1,264	108	1	3	8,289	11,745	252	137	21	3	44	10
Upstate N.Y.	252	40	1	2	1,610	2,173	153	67	14	-	13	-
N.Y. City	460	9	-	-	1,139	5,648	25	6	-	-	3	-
N.J.	402	-	-	-	1,917	2,289	11	9	2	-	5	10
Pa.	150	59	-	1	3,623	1,635	63	55	5	3	23	-
E.N. CENTRAL	381	115	15	2	13,707	21,067	306	242	106	8	26	9
Ohio	59	39	4	1	3,515	6,543	92	60	29	4	13	4
Ind.	25	16	5	1	1,872	1,989	71	44	1	-	3	-
Ill.	215	14	2	-	4,435	5,941	31	5	1	-	-	-
Mich.	54	43	4	-	3,458	5,251	50	92	17	4	9	5
Wis.	28	3	-	-	427	1,343	62	41	58	-	1	-
W.N. CENTRAL	201	49	8	-	4,431	5,882	572	56	36	2	9	1
Minn.	45	9	5	-	462	654	47	4	2	1	2	-
Iowa	14	16	-	-	315	456	13	4	2	-	-	1
Mo.	123	10	-	-	2,637	3,231	114	38	32	1	4	-
N. Dak.	-	-	-	-	-	33	3	-	-	-	-	-
S. Dak.	-	6	3	-	84	38	320	1	-	-	1	-
Nebr.	11	7	-	-	330	236	63	8	-	-	2	-
Kans.	8	1	-	-	603	1,234	12	1	-	-	-	-
S. ATLANTIC	1,438	152	12	1	26,533	30,189	210	485	74	47	18	13
Del.	11	4	-	-	338	380	4	9	1	-	-	3
Md.	134	21	3	-	2,845	3,403	56	66	22	3	6	5
D.C.	86	8	-	-	1,779	1,035	15	17	-	1	-	-
Va.	156	27	2	-	2,240	2,857	25	35	3	37	2	2
W. Va.	7	2	-	-	186	192	4	9	-	2	-	-
N.C.	71	30	4	-	5,301	5,386	47	139	27	-	5	3
S.C.	49	7	-	-	2,104	2,715	8	111	15	-	3	-
Ga.	222	11	2	1	6,676	7,098	22	66	1	-	1	-
Fla.	702	42	1	-	5,064	7,123	29	33	5	4	1	-
E.S. CENTRAL	104	63	4	-	6,816	9,001	29	157	55	2	11	8
Ky.	19	17	2	-	828	961	6	37	1	2	5	5
Tenn.	39	16	2	-	2,041	2,513	14	102	51	-	4	2
Ala.	29	22	-	-	2,035	3,663	9	18	3	-	2	1
Miss.	17	8	-	-	1,912	1,864	-	-	-	-	-	-
W.S. CENTRAL	417	46	6	-	8,331	9,924	391	139	10	22	5	-
Ark.	17	25	1	-	1,013	1,500	66	4	1	-	-	-
La.	90	4	1	-	1,649	1,929	23	36	1	-	1	-
Okla.	19	1	3	-	985	871	78	45	7	5	4	-
Tex.	291	16	1	-	4,684	5,624	224	54	1	17	-	-
MOUNTAIN	147	32	5	-	1,536	2,307	610	143	25	43	17	1
Mont.	4	1	-	-	9	20	25	19	-	2	-	-
Idaho	1	-	-	-	22	14	7	14	-	-	1	-
Wyo.	3	-	-	-	18	22	39	3	-	-	-	1
Colo.	81	11	1	-	317	726	35	21	8	5	3	-
N. Mex.	11	3	-	-	168	164	207	15	1	18	1	-
Ariz.	8	10	4	-	660	883	202	33	4	15	5	-
Utah	3	2	-	-	55	65	55	5	4	3	4	-
Nev.	36	5	-	-	287	413	40	33	8	-	3	-
PACIFIC	1,133	111	11	-	8,663	11,533	1,013	495	121	77	10	15
Wash.	35	-	-	-	584	1,021	89	72	17	3	-	-
Oreg.	23	-	-	-	296	419	60	40	21	2	-	-
Calif.	1,027	97	11	-	7,507	9,812	837	371	77	71	9	15
Alaska	3	3	-	-	129	204	22	4	5	1	-	-
Hawaii	45	11	-	-	147	77	5	8	1	-	1	-
Guam	-	-	-	-	-	41	-	-	-	-	-	-
P.R.	290	26	-	-	65	215	13	46	11	3	-	-
V.I.	1	-	-	-	62	81	-	2	-	-	-	-
Amer. Samoa	-	-	-	-	-	31	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	-	38	-	-	-	-	-	-

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 February 23, 1991, and February 24, 1990 (8th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1991	1991	Cum. 1991	1991	Cum. 1991	Cum. 1990	Cum. 1991	1991	Cum. 1991	1991	Cum. 1991	Cum. 1990	1991	Cum. 1991	Cum. 1990
UNITED STATES	129	23	479	1	14	2,455	301	47	419	40	324	465	2	49	55
NEW ENGLAND	11	-	-	-	-	70	34	-	7	1	23	65	-	-	1
Maine	-	-	-	-	-	25	4	-	-	1	4	1	-	-	-
N.H.	1	-	-	-	-	6	5	-	-	-	8	6	-	-	-
Vt.	1	-	-	-	-	-	4	-	-	-	-	2	-	-	-
Mass.	6	-	-	-	-	-	16	-	-	-	11	53	-	-	-
R.I.	2	-	-	-	-	10	-	-	2	-	-	-	-	-	1
Conn.	1	-	-	-	-	29	5	-	5	-	-	3	-	-	-
MID. ATLANTIC	13	-	173	-	-	207	34	3	31	6	42	119	-	2	1
Upstate N.Y.	4	-	-	-	-	145	16	2	15	4	22	100	-	-	1
N.Y. City	3	-	-	-	-	19	-	-	-	-	-	-	-	-	-
N.J.	4	-	3	-	-	12	7	-	-	-	1	8	-	-	-
Pa.	2	-	170	-	-	31	11	1	16	2	19	11	-	2	-
E.N. CENTRAL	8	3	4	1	2	1,234	39	-	38	8	60	126	1	2	4
Ohio	-	1	1	1†	1	93	12	-	-	5	30	15	-	-	-
Ind.	1	-	-	-	-	48	4	-	3	-	15	28	-	1	-
Ill.	1	-	-	-	-	507	6	-	16	-	-	41	-	-	4
Mich.	6	2	3	-	-	181	13	-	16	3	12	12	1	1	-
Wis.	-	-	-	-	1	405	4	-	3	-	3	30	-	-	-
W.N. CENTRAL	2	-	-	-	-	92	11	1	11	-	27	14	-	1	-
Minn.	-	-	-	-	-	28	4	-	2	-	11	1	-	1	-
Iowa	1	-	-	-	-	21	1	-	5	-	4	1	-	-	-
Mo.	1	-	-	-	-	43	2	-	2	-	9	9	-	-	-
N. Dak.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
S. Dak.	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-
Nebr.	-	-	-	-	-	-	1	1	1	-	2	1	-	-	-
Kans.	-	-	-	-	-	-	1	-	1	-	-	1	-	-	-
S. ATLANTIC	35	1	16	-	1	150	59	17	157	4	20	45	-	3	2
Del.	-	1	1	-	-	1	-	-	-	-	-	2	-	-	-
Md.	11	-	-	-	-	20	8	4	53	1	1	18	-	3	-
D.C.	3	-	-	-	-	1	-	-	3	-	-	1	-	-	-
Va.	7	-	-	-	-	5	7	3	10	-	2	4	-	-	-
W. Va.	1	-	-	-	-	-	1	-	3	1	5	5	-	-	-
N.C.	1	-	-	-	-	3	19	-	55	-	8	5	-	-	-
S.C.	4	-	12	-	-	-	5	8	23	-	-	-	-	-	-
Ga.	3	-	-	-	-	1	10	2	5	2	3	7	-	-	-
Fla.	5	-	3	-	1	119	9	-	5	-	1	3	-	-	2
E.S. CENTRAL	1	-	-	-	-	15	26	1	11	3	12	13	-	-	-
Ky.	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-
Tenn.	-	-	-	-	-	11	5	1	4	-	7	3	-	-	-
Ala.	1	-	-	-	-	-	9	-	1	3	5	10	-	-	-
Miss.	-	-	-	-	-	4	-	-	6	-	-	-	-	-	-
W.S. CENTRAL	6	-	-	-	5	90	16	15	53	-	9	2	-	-	-
Ark.	-	-	-	-	5	-	2	-	6	-	-	-	-	-	-
La.	1	-	-	-	-	-	6	3	8	-	6	1	-	-	-
Okla.	1	-	-	-	-	3	2	-	1	-	3	1	-	-	-
Tex.	4	-	-	-	-	87	6	12	38	-	-	-	-	-	-
MOUNTAIN	6	3	58	-	4	52	11	6	22	10	50	43	-	1	-
Mont.	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	1	-	1	1	1	2	9	2	-	-	-
Wyo.	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-
Colo.	2	-	-	-	1	5	3	1	4	3	13	30	-	-	-
N. Mex.	1	3	49	-	2	2	2	N	N	1	7	2	-	-	-
Ariz.	3	-	2	-	-	35	3	1	14	-	7	6	-	-	-
Utah	-	-	-	-	-	-	-	3	3	4	10	1	-	-	-
Nev.	-	-	7	-	-	10	-	-	-	-	-	2	-	1	-
PACIFIC	47	16	228	-	2	545	71	4	89	8	81	38	1	40	47
Wash.	5	-	-	-	-	13	3	2	8	7	12	8	-	-	-
Oreg.	1	-	-	-	-	18	7	N	N	1	6	5	-	-	-
Calif.	40	16	226	-	2	502	60	2	75	-	45	22	1	39	43
Alaska	-	-	-	-	-	12	1	-	4	-	4	-	-	-	-
Hawaii	1	-	2	-	-	-	-	-	2	-	14	3	-	1	4
Guam	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
P.R.	-	-	-	-	1	25	3	-	1	-	4	-	-	-	-
V.I.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
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 February 23, 1991, and February 24, 1990 (8th Week)

Reporting Area	Syphilis (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1991	Cum. 1990	Cum. 1991	Cum. 1991	Cum. 1990	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991
UNITED STATES	6,275	6,706	62	2,558	2,758	4	48	13	573
NEW ENGLAND	170	282	5	61	46	-	5	2	-
Maine	-	1	3	-	-	-	-	-	-
N.H.	1	25	1	-	1	-	-	-	-
Vt.	1	-	-	-	2	-	-	-	-
Mass.	88	96	1	23	18	-	5	2	-
R.I.	7	1	-	16	12	-	-	-	-
Conn.	73	159	-	22	13	-	-	-	-
MID. ATLANTIC	1,190	1,218	12	597	702	-	7	-	210
Upstate N.Y.	87	57	7	21	81	-	1	-	58
N.Y. City	531	873	-	445	460	-	2	-	-
N.J.	187	241	-	107	81	-	4	-	88
Pa.	385	47	5	24	80	-	-	-	64
E.N. CENTRAL	578	380	11	332	281	1	5	-	4
Ohio	73	62	8	65	30	-	1	-	1
Ind.	13	4	-	11	20	-	-	-	-
Ill.	298	154	1	195	145	-	-	-	-
Mich.	116	99	2	42	76	1	4	-	-
Wis.	78	61	-	19	10	-	-	-	3
W.N. CENTRAL	93	58	13	66	72	-	1	-	78
Minn.	11	14	6	6	13	-	1	-	30
Iowa	13	5	4	14	6	-	-	-	14
Mo.	68	29	3	27	31	-	-	-	2
N. Dak.	-	1	-	2	3	-	-	-	8
S. Dak.	1	-	-	4	4	-	-	-	17
Nebr.	-	2	-	3	7	-	-	-	2
Kans.	-	7	-	10	8	-	-	-	5
S. ATLANTIC	1,952	2,347	4	328	401	-	8	8	157
Del.	18	33	1	5	9	-	-	-	25
Md.	197	160	-	24	37	-	4	1	65
D.C.	108	91	-	27	10	-	-	-	1
Va.	147	125	1	24	24	-	1	-	26
W. Va.	4	2	-	14	6	-	1	-	10
N.C.	281	272	2	60	62	-	-	6	-
S.C.	255	152	-	49	76	-	-	-	5
Ga.	457	621	-	57	52	-	2	1	23
Fla.	485	891	-	68	125	-	-	-	2
E.S. CENTRAL	674	573	1	177	178	-	-	2	12
Ky.	9	12	-	47	63	-	-	1	4
Tenn.	310	175	-	-	44	-	-	-	-
Ala.	183	223	1	58	59	-	-	1	8
Miss.	172	163	-	72	12	-	-	-	-
W.S. CENTRAL	945	976	1	249	366	2	-	1	54
Ark.	53	68	-	27	36	1	-	-	5
La.	308	318	-	46	94	-	-	-	3
Okla.	27	31	1	11	22	1	-	1	17
Tex.	557	559	-	165	214	-	-	-	29
MOUNTAIN	97	137	8	64	43	1	1	-	6
Mont.	1	-	-	-	-	1	-	-	3
Idaho	3	1	-	-	-	-	-	-	1
Wyo.	1	-	-	-	1	-	-	-	-
Colo.	11	12	-	6	-	-	-	-	1
N. Mex.	6	11	3	-	8	-	-	-	-
Ariz.	67	87	2	42	20	-	1	-	1
Utah	1	1	3	13	-	-	-	-	-
Nev.	7	25	-	3	14	-	-	-	-
PACIFIC	576	735	7	684	669	-	21	-	52
Wash.	20	70	-	31	39	-	-	-	-
Oreg.	19	17	-	12	17	-	1	-	1
Calif.	536	637	7	610	573	-	19	-	51
Alaska	1	4	-	3	13	-	-	-	-
Hawaii	-	7	-	28	27	-	1	-	-
Guam	-	-	-	-	9	-	-	-	-
P.R.	47	75	-	15	9	-	-	-	5
V.I.	8	-	-	1	1	-	-	-	-
Amer. Samoa	-	-	-	-	5	-	-	-	-
C.N.M.I.	-	-	-	-	6	-	-	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending February 23, 1991 (8th Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	693	518	113	40	13	9	74
Boston, Mass.	194	131	37	16	5	5	25
Bridgeport, Conn.	40	33	3	4	-	-	4
Cambridge, Mass.	27	21	4	2	-	-	1
Fall River, Mass.	40	35	5	-	-	-	1
Hartford, Conn.	52	38	7	4	2	1	3
Lowell, Mass.	23	16	4	3	-	-	2
Lynn, Mass.	17	12	3	2	-	-	2
New Bedford, Mass.	26	21	4	1	-	-	2
New Haven, Conn.	44	35	5	2	2	-	3
Providence, R.I.	53	37	15	-	-	1	6
Somerville, Mass.	8	7	1	-	-	-	-
Springfield, Mass.	53	37	9	3	2	2	4
Waterbury, Conn.	47	37	8	1	1	-	8
Worcester, Mass.	69	58	8	2	1	-	13
MID. ATLANTIC	2,838	1,839	579	305	50	65	161
Albany, N.Y.	59	40	11	3	1	4	5
Allentown, Pa.	25	19	4	1	1	-	4
Buffalo, N.Y.	96	63	25	4	2	2	7
Camden, N.J.	46	26	10	7	2	1	3
Elizabeth, N.J.	23	17	3	3	-	-	1
Erie, Pa.†	50	38	11	1	-	-	3
Jersey City, N.J.	49	28	12	9	-	-	3
New York City, N.Y.	1,471	924	292	204	21	30	59
Newark, N.J.	49	28	12	9	-	-	3
Paterson, N.J.	36	26	5	1	2	2	3
Philadelphia, Pa.	427	251	102	34	20	20	31
Pittsburg, Pa.†	60	43	12	4	-	1	2
Reading, Pa.	40	32	4	4	-	-	9
Rochester, N.Y.	139	103	25	9	1	1	4
Schenectady, N.Y.	37	25	8	4	-	-	3
Scranton, Pa.†	34	26	7	1	-	-	2
Syracuse, N.Y.	99	70	21	5	-	3	9
Trenton, N.J.	39	32	6	1	-	-	2
Utica, N.Y.	18	17	1	-	-	-	1
Yonkers, N.Y.	41	31	8	1	-	1	7
E.N. CENTRAL	2,178	1,525	380	128	37	108	119
Akron, Ohio	50	41	7	1	-	1	-
Canton, Ohio	30	24	2	3	-	1	3
Chicago, Ill.	502	371	51	13	5	62	18
Cincinnati, Ohio	123	88	22	6	3	4	13
Cleveland, Ohio	153	96	42	8	4	3	5
Columbus, Ohio	177	118	36	10	4	9	5
Dayton, Ohio	101	71	23	5	2	-	10
Detroit, Mich.	199	121	33	32	8	5	5
Evansville, Ind.	43	34	5	3	-	1	4
Fort Wayne, Ind.	56	39	14	2	1	-	3
Gary, Ind.	18	7	4	6	-	1	1
Grand Rapids, Mich.	70	50	10	5	-	5	7
Indianapolis, Ind.	185	125	39	14	4	3	12
Madison, Wis.S	29	16	7	2	3	1	2
Milwaukee, Wis.	154	120	25	6	-	3	14
Peoria, Ill.	45	27	12	3	-	3	-
Rockford, Ill.	51	35	13	-	1	2	3
South Bend, Ind.	68	51	12	3	1	1	6
Toledo, Ohio	65	48	13	3	1	-	4
Youngstown, Ohio	59	43	10	3	-	3	4
W.N. CENTRAL	725	532	121	35	19	18	51
Des Moines, Iowa	75	53	17	2	1	2	10
Duluth, Minn.	27	25	2	-	-	-	-
Kansas City, Kans.	43	25	11	4	3	-	1
Kansas City, Mo.	102	68	20	7	3	4	2
Lincoln, Nebr.	32	28	4	-	-	-	3
Minneapolis, Minn.	115	87	19	6	2	1	11
Omaha, Nebr.	92	71	12	5	3	1	9
St. Louis, Mo.	105	75	15	8	1	6	8
St. Paul, Minn.	43	32	6	1	1	3	3
Wichita, Kans.	91	68	15	2	5	1	4

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
S. ATLANTIC	1,271	781	277	121	44	46	79
Atlanta, Ga.	181	99	50	20	3	9	4
Baltimore, Md.	116	68	28	13	4	3	15
Charlotte, N.C.	93	60	25	4	2	2	7
Jacksonville, Fla.	128	85	26	10	3	4	13
Miami, Fla.	106	75	19	8	2	2	-
Norfolk, Va.	80	45	23	6	4	2	6
Richmond, Va.	81	52	16	10	2	1	8
Savannah, Ga.	57	37	12	5	2	1	4
St. Petersburg, Fla.	87	68	12	4	1	2	4
Tampa, Fla.	142	94	23	11	7	6	14
Washington, D.C.	185	85	42	30	13	14	4
Wilmington, Del.	15	13	1	-	1	-	-
E.S. ATLANTIC	693	454	152	44	14	29	61
Birmingham, Ala.	143	83	33	10	4	13	5
Chattanooga, Tenn.	53	32	14	3	2	2	11
Knoxville, Tenn.	83	58	21	3	-	1	12
Louisville, Ky.	42	26	10	3	1	2	1
Memphis, Tenn.	180	125	33	13	6	3	17
Mobile, Ala.	10	3	3	-	-	4	1
Montgomery, Ala.	32	24	6	1	-	1	2
Nashville, Tenn.	150	103	32	11	1	3	12
W.S. ATLANTIC	1,274	785	277	136	41	35	90
Austin, Tex.	59	37	12	6	4	-	4
Baton Rouge, La.	44	34	6	2	1	1	3
Corpus Christi, Tex.	34	20	11	3	-	-	1
Dallas, Tex.	203	117	52	23	9	2	5
El Paso, Tex.	61	37	13	7	2	2	10
Ft. Worth, Tex.	81	61	13	2	2	3	5
Houston, Tex.	296	155	64	55	7	15	35
Little Rock, Ark.	74	47	16	5	2	4	2
New Orleans, La.	82	39	22	14	6	1	-
San Antonio, Tex.	194	136	34	13	8	3	9
Shreveport, La.	51	40	9	2	-	-	4
Tulsa, Okla.	95	62	25	4	-	4	12
MOUNTAIN	765	520	150	51	27	17	44
Albuquerque, N.M.	94	68	16	8	2	-	5
Colo. Springs, Colo.	55	35	17	1	2	-	4
Denver, Colo.	129	84	25	10	6	4	11
Las Vegas, Nev.	101	66	27	6	2	-	5
Ogden, Utah	18	11	6	-	-	1	3
Phoenix, Ariz.	169	117	30	11	5	6	7
Pueblo, Colo.	23	16	4	1	2	-	-
Salt Lake City, Utah	52	34	7	3	4	4	2
Tucson, Ariz.	124	89	18	11	4	2	7
PACIFIC	1,771	1,191	292	161	60	57	108
Berkeley, Calif.	21	16	4	-	-	1	-
Fresno, Calif.	118	79	21	11	3	4	10
Glendale, Calif.	26	15	4	3	2	1	-
Honolulu, Hawaii	80	59	16	2	-	3	10
Long Beach, Calif.	56	34	15	2	3	2	4
Los Angeles, Calif.	418	283	59	42	18	9	18
Oakland, Calif.§	U	U	U	U	U	U	U
Pasadena, Calif.	47	35	6	-	-	6	3
Portland, Oreg.	125	83	24	11	3	4	7
Sacramento, Calif.	154	101	27	13	10	3	17
San Diego, Calif.	106	77	13	10	3	3	6
San Francisco, Calif.	171	93	28	38	8	2	4
San Jose, Calif.	152	100	32	10	4	6	13
Seattle, Wash.	147	105	24	8	4	6	5
Spokane, Wash.	58	52	4	1	1	-	5
Tacoma, Wash.	92	59	15	10	1	7	6
TOTAL	12,208††	8,145	2,341	1,021	305	384	787

*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.

§Report for this week is unavailable (U).

Effectiveness in Disease and Injury Prevention

Control of Excessive Lead Exposure in Radiator Repair Workers

In 1988, 83 automotive repair workers with blood lead levels (BLLs) >25 μg/dL were reported to state health departments in the seven states* that collaborated with CDC's National Institute for Occupational Safety and Health (NIOSH) in maintaining registries of elevated BLLs in adults. In 18 (22%) of these 83 persons, BLLs were >50 μg/dL†. Among automotive repair workers for whom a job category was specified, radiator repair work was the principal source of lead exposure. The major sources of exposure for radiator repair workers are lead fumes generated during soldering and lead dust produced during radiator cleaning (*2*). This report summarizes current BLL surveillance data for radiator repair workers and describes three control technologies that are effective in reducing lead exposures in radiator repair shops.

Airborne lead levels as high as 500 μg/m^3 (10 times greater than the Occupational Safety and Health Administration [OSHA] permissible exposure limit [PEL] of 50 μg/m^3) have been reported in small radiator repair shops (*3*). Engineering controls in such facilities typically consist of wall- or roof-mounted propeller fans, which provide general area ventilation, or electrostatic precipitators suspended from the ceiling, which remove airborne particulates (*2*). However, neither method reduces worker lead exposures to levels below the OSHA PEL. In 1989, to meet the need for effective engineering controls in radiator repair shops, NIOSH researchers studied three exhaust-ventilation control systems for radiator shops. Each of the three local control systems effectively reduced radiator repair workers' lead exposures to levels substantially below the OSHA PEL. The performance of each control system was documented by collecting personal breathing-zone samples for lead and by measuring local exhaust-ventilation system airflow capacities.

Ventilated Enclosure

An enclosure resembling a laboratory hood surrounds the workstation (*4*). The enclosure's walls are curtains of silicone-coated fibrous glass cloth, which have a temperature rating of 1000 F (538 C), cannot be set on fire by a mechanic's torches, and will not corrode. The curtains are suspended from the building's ceiling and extend to the top outer edges of a water bath (used to leak-test radiators). The ceiling forms the top of the enclosure; the back wall of the building, which has a propeller exhaust fan, forms the rear wall. A 3-foot by 3-foot opening in the front of the enclosure permits the mechanic access to repair the radiator, which remains within the enclosure. The fan exhausts air at a rate of 2000 cubic feet per minute (cfm), producing an air flow of 200 feet per minute (fpm) through the enclosure opening.

The approximate cost of the enclosure was $1000 (1990 dollars), which included structural materials, installation, and a wall-mounted axial fan with motor. During the study of this system, lead exposures for the radiator repair worker using the ventilated enclosure averaged 9.9 μg/m^3. Comparison personal breathing-zone sam-

*California, Colorado, Maryland, New Jersey, New York, Texas, and Wisconsin.

†Under the Occupational Safety and Health Administration lead standard, BLLs exceeding an average of 50 μg/dL on three separate occasions in a 6-month period require medical removal of the employee from the workplace (*1*).

Lead Exposure — Continued

ples obtained from a radiator repair mechanic in the same shop who worked at an identical workstation without ventilation control averaged 453 μg/m³.

Movable Exhaust Hood

A canopy-shaped exhaust hood with a 24-inch by 36-inch opening is connected to an 8-inch diameter flexible duct that permits the hood to be moved directly to the work that generates lead fume. The face velocity at the hood opening is approximately 100 fpm. The cost of the hood and duct work for each workstation was $1000 (1990 dollars). Lead exposures for the busiest mechanic averaged 12 μg/m³. In comparison, personal sampling data collected at this shop by the Virginia Occupational Safety and Health Department before the exhaust hood installation found time-weighted average lead exposures for workers at levels as high as 193 μg/m³ (R.D. Mitchell, Virginia Occupational Safety and Health Department, personal communication, December 20, 1988).

Ventilated Booth

A shop owner, using design information provided by NIOSH, relocated the shop's two existing radiator repair benches against an outside wall and enclosed them in a booth. Cement-block walls form the sides, a welding curtain encloses the top of the booth, and a strip of plastic across the bottom 3 feet of the front of the booth creates a front opening 11.5 feet wide by 4 feet high. An axial, belt-driven fan (exhaust capacity 14,000 cfm) was installed in the outside wall at the rear of the booth, which produced a 250 fpm face velocity airflow through the front opening. The cost of the control system, including materials and labor, for two workstations was approximately $2200 (1990 dollars); this included a set of high-intensity lights costing $250. The average lead exposure for radiator repair workers using this system was 9 μg/m³, a reduction of 91% compared with an average lead exposure of 98 μg/m³ (range: 30–220 μg/m³) measured during a NIOSH health hazard evaluation conducted before installation of the control (*5*).

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Editorial Note: The manifestations of symptomatic lead poisoning (convulsions, coma, neuropathy, nephropathy, anemia, and abdominal colic) generally occur at BLLs >80 μg/dL. Adverse health effects at lower BLLs include inhibition of heme production, peripheral neuropathy, male and female reproductive dysfunction, and hypertension (*6*). In occupational settings, absorption of lead results primarily from exposure to lead dust and fumes. Data from the National Occupational Exposure Survey, conducted during 1981–1983, indicated that approximately 827,000 U.S. workers have potential work-related exposure to lead (excluding those with exposure to lead in gasoline) (*7*). Workplace exposure also has been described as a vector for childhood and community lead exposure through contamination of work clothing (*8*).

Current estimates indicate that approximately 435,000 workers are employed in the automotive repair industry (*9*); an estimated 40,000 are involved specifically in radiator repair work, with an average of four workers in each shop (W.H. Juchno, National Automotive Radiator Service Association, personal communication, March 15, 1990). Studies in a variety of settings indicate that lead exposure is substantial in these workers. For example, in Finland, the mean BLL in 56 radiator repair workers was 38 μg/dL, which represented the sixth highest value among 30 occupational categories (*10*). NIOSH health hazard evaluations conducted from 1979

Lead Exposure — Continued

through 1990 at radiator repair shops in California, Colorado, and Georgia found that, among 46 radiator repair workers, 68% had lead exposures exceeding the OSHA PEL, 83% had BLLs ≥30 µg/dL, and 26% had BLLS ≥50 µg/dL. Finally, among 56 radiator repair mechanics in the Boston area, 80% had BLLs >30 µg/dL, and 16% had BLLs >50 µg/dL (*2*).

By applying representative BLL findings from these studies to the estimated 40,000 U.S. radiator workers, BLLs in approximately 32,000 (80%) workers exceed 30 µg/dL, BLLs in 16,000 (40%) exceed 40 µg/dL, and BLLs in 8400 (21%) exceed 50 µg/dL. Based on this approach, the 83 cases of elevated BLLs reported to the seven state health departments in 1988 represent a substantial underestimation of the prevalence of this condition.

In general, environmental monitoring and medical surveillance for lead exposure in radiator repair workers is inadequate. For example, in California in 1986, only 1.4% of these workers were employed in positions where environmental monitoring was ever done; only 7.9% of the surveyed radiator repair shops performed any routine biologic monitoring (*11*). Inadequate medical surveillance of these workers can result in substantial underestimation of the number of workers at risk for lead toxicity and further underscores the need for both improved monitoring and effective engineering controls to protect the health of these workers. The three economic and effective ventilation control systems described in this report have potential for widespread application in relatively small radiator shops that lack resources for purchase of elaborate ventilation systems.[§]

References

1. Office of the Federal Register. Code of federal regulations: occupational safety and health standards. Subpart Z: Toxic and hazardous substances—lead. Washington, DC: Office of the Federal Register, National Archives and Records Administration, 1985. (29 CFR § 1910.1025).
2. Goldman RH, Baker EL, Hannan M, et al. Lead poisoning in automobile radiator mechanics. N Engl J Med 1987;317:214–8.
3. Gunter BJ, Pryor RD, NIOSH. Health hazard evaluation report no. HETA 80-89-723. Cincinnati: US Department of Health and Human Services, Public Health Service, CDC, 1980.
4. Goldfield J, Sheehy JW, Gunter BJ, Daniels WJ. Cost-effective radiator repair ventilation control. Appl Occup Environ Hyg (in press).
5. Gunter BJ, Hales T, NIOSH. Health hazard evaluation report no. HETA 89-232-2015. Cincinnati: US Department of Health and Human Services, Public Health Service, CDC, 1990.
6. Agency for Toxic Substances and Disease Registry. Toxicological profile for lead. Atlanta: US Department of Health and Human Services, Public Health Service, 1990:27–8; no. TP 88-117.
7. Seta JA, Sundin DS, Pederson DH. National Occupational Exposure Survey: field guidelines. Vol 1. Survey manual. Cincinnati: US Department of Health and Human Services, Public Health Service, CDC, 1988; DHHS publication no. (NIOSH)88-106.
8. Kaye WE, Novotny TE, Tucker M. New ceramics-related industry implicated in elevated blood lead levels in children. Arch Environ Health 1987;42:161–4.
9. Bureau of the Census. County business patterns, 1986. Washington, DC: US Department of Commerce, Bureau of the Census, 1988; no. CBP-86-1.
10. Tola S, Hernberg S, Vesanto R. Occupational lead exposure in Finland. VI. Final report. Scand J Work Environ Health 1987;2:115–27.
11. Rudolph L, Sharp DS, Samuels S, Perkins C, Rosenberg J. Environmental and biological monitoring for lead exposure in California workplaces. Am J Public Health 1990;80:921–5.

[§]To obtain the latest reports on engineering controls for radiator repair shops, contact John W. Sheehy, NIOSH, CDC, Mailstop R-5, 4676 Columbia Parkway, Cincinnati, OH 45226; telephone (513) 841-4221.

Notices to Readers

NIOSH Alerts on Workplace Hazards: Falls Through Skylights and Roof Openings, Deaths of Farm Workers in Manure Pits, and Exposure to Dimethylformamide

CDC's National Institute for Occupational Safety and Health (NIOSH) periodically issues alerts on workplace hazards that have caused injury, illness, or death to workers. Three alerts are now available about the serious hazards posed by skylights and roof openings, manure pits, and the organic solvent dimethylformamide (DMF).* Each alert is summarized briefly below.

NIOSH Alert: Request for Assistance in Preventing Worker Deaths and Injuries from Falls Through Skylights and Roof Openings (*1*). Fatal falls frequently result from inadequate guarding and fall protection for work around skylights, skylight openings, and other roof openings. More frequent use of skylights in new construction has increased the risk to workers for such falls. This alert describes eight incidents in which workers died from falls through skylights or roof openings. NIOSH recommends four steps to prevent fatal falls through skylights and roof openings: 1) strict adherence to applicable Occupational Safety and Health Administration (OSHA) regulations, 2) adequate worker training to recognize fall hazards, 3) placement of decals on skylights to warn workers against sitting or stepping on them, and 4) design of skylights to support the weight of a worker who steps, sits, or falls on one.

NIOSH Alert: Request for Assistance in Preventing Deaths of Farm Workers in Manure Pits (*2*). Farm workers who enter manure pits risk death from exposure to oxygen-deficient, toxic, or explosive atmospheres resulting from fermentation of the animal wastes in these confined spaces. Gases commonly encountered in manure pits include methane, hydrogen sulfide, carbon dioxide, and ammonia. The hazards of manure pits have been known for several years, but recent NIOSH investigations suggest that many farm workers are unaware of the danger, and deaths continue to occur after entry into these pits. This alert describes two incidents (*3*) that resulted in seven deaths from asphyxiation in manure pits. Victims in both incidents included rescuers who were members of the same family. Deaths in manure pits occur most frequently from April through September, when warm weather may result in increased gas accumulation. Manure pits should be treated as confined spaces, with proper ventilation, testing of the atmosphere before entry, presence of a standby person outside the manure pit, and use of a safety belt or harness with a lifeline attached to mechanical lifting equipment. A positive-pressure, self-contained breathing apparatus should be used if an oxygen-deficient or toxic atmosphere is detected. No one should enter a manure pit unless it is absolutely necessary and proper precautions have been taken.

NIOSH Alert: Request for Assistance in Preventing Adverse Health Effects from Exposure to Dimethylformamide (DMF) (*4*). NIOSH estimates that >100,000 U.S. workers may be exposed to DMF, an organic solvent that is readily absorbed through

*Single copies are available without charge from the Publications Dissemination Section, Division of Standards Development and Technology Transfer, NIOSH, CDC, 4676 Columbia Parkway, Cincinnati, OH 45226; telephone (513) 533-8287.

Workplace Hazards — Continued

the skin. This chemical is toxic to the liver and can cause skin problems and alcohol intolerance. Some reports also suggest an increase in cancer among workers exposed to DMF, but the evidence is not conclusive. DMF is used in acrylic fiber spinning, chemical manufacturing, and pharmaceutical production; it is also present in textile dyes and pigments, paint stripping solvents, and coating, printing, and adhesive formulations. Workers exposed to DMF should be informed about its adverse health effects and trained to avoid skin contact and to use appropriate protective equipment and work practices. Employers should institute engineering controls to ensure that DMF exposures do not exceed the NIOSH recommended exposure limit/OSHA permissible exposure limit of 10 ppm as an 8-hour time-weighted average (*5*). Environmental and biological monitoring should be instituted if skin contact with liquid DMF is possible, and medical screening should be performed under certain circumstances, as outlined in the alert.

Reported by: Div of Standards Development and Technology Transfer, National Institute for Occupational Safety and Health, CDC.

References

1. NIOSH. NIOSH alert: request for assistance in preventing worker deaths and injuries from falls through skylights and roof openings. Cincinnati, Ohio: US Department of Health and Human Services, Public Health Service, CDC, 1990; DHHS publication no. (NIOSH)90-100.
2. NIOSH. NIOSH alert: request for assistance in preventing deaths of farm workers in manure pits. Cincinnati, Ohio: US Department of Health and Human Services, Public Health Service, CDC, 1990; DHHS publication no. (NIOSH)90-103.
3. CDC. Fatalities attributed to methane asphyxia in manure waste pits—Ohio, Michigan, 1989. MMWR 1989;38:583–6.
4. NIOSH. NIOSH alert: request for assistance in preventing adverse health effects from exposure to dimethylformamide (DMF). Cincinnati, Ohio: US Department of Health and Human Services, Public Health Service, CDC, 1990; DHHS publication no. (NIOSH)90-105.
5. Office of the Federal Register. Code of federal regulations: occupational safety and health standards. Subpart Z: Air contaminants—permissible exposure limits. Table Z-1-A. Washington, DC: Office of the Federal Register, National Archives and Records Administration, 1989. (29 CFR § 1910.1000).

Third National Injury Control Conference

The Third National Injury Control Conference will be held in Denver, Colorado, on April 22–25, 1991. The conference is cosponsored by CDC's Center for Environmental Health and Injury Control and National Institute for Occupational Safety and Health and the Department of Transportation's National Highway Traffic Safety Administration. The conference theme is "Setting the National Agenda for Injury Control in the 1990s."

Additional information is available from the Chief, Program Services Section, Program Development and Implementation Branch, Division of Injury Control, Center for Environmental Health and Injury Control, CDC, Mailstop F-36, 1600 Clifton Road, NE, Atlanta, GA 30333; telephone (404) 488-4662 or FTS 236-2662.

The *Morbidity and Mortality Weekly Report* is prepared by the Centers for Disease Control, Atlanta, Georgia, and available on a paid subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 783-3238.

The data in this report 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. The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333; telephone (404) 332-4555.

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