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MORBIDITY AND MORTALITY WEEKLY REPORT

Recommendation of the Immunization Practices Advisory Committee (ACIP)

Rabies Prevention

These revised recommendations by the Immunization Practices Advisory Committee (ACIP) reflect the availability of the new human diploid cell rabies vaccine (HDCV). For assistance on problems or questions about rabies prophylaxis, call your local or state health department or the Viral Diseases Division, Bureau of Epidemiology, Center for Disease Control (404/329-3727 during working hours, or 404/329-3644 nights, weekends, and holidays).*

INTRODUCTION

Although rabies rarely affects humans in the United States, every year thousands of persons receive rabies prophylaxis. Managing those who possibly have been exposed to rabies infection is of paramount importance. The following is an interpretation of both the risk of infection and the efficacy and risk of prophylactic treatment.

The problem of treating persons who have been bitten or scratched by animals suspected of being infective or who have otherwise been potentially exposed to rabies is a perplexing one for physicians. All available methods of systemic prophylactic treatment are complicated by instances of adverse reactions, a few of which have resulted in death or permanent disability. Furthermore, decisions on management must be made immediately because the longer treatment is postponed, the less likely it is to be effective.

Data on the efficacy of active and passive immunization after rabies exposure have come principally from studies with animals. Because rabies has occasionally developed in humans who had received postexposure antirabies prophylaxis, the efficacy of the vaccine has been questioned. Evidence from laboratory and field experience in many areas of the world, however, indicates that postexposure prophylaxis is effective when appropriately used.

Rabies in humans has decreased from an average of 22 cases per year in 1946-1950 to only 1-5 cases per year since 1960. The number of cases of rabies in domestic animals has decreased similarly. In 1946, for example, there were more than 8,000 cases of rabies in dogs, compared with 122 cases in 1978. Thus, the likelihood of human exposure to rabies in domestic animals has decreased greatly, although bites by dogs and cats continue to be the principal reason for giving antirabies treatments.

The disease in wildlife—especially skunks, foxes, raccoons, and bats—has become increasingly prominent in recent years, accounting for more than 70% of all reported cases of animal rabies every year since 1968. Wild animals now constitute the most important source of infection for humans and domestic animals in the United States. Rabies in

*Licensed by the Food and Drug Administration on June 9, 1980; contact state health department or Merieux Institute (1-800-327-8387) for information on vaccine availability.

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animals is present throughout the United States, with only Hawaii and the District of Columbia reporting none in the period 1974 to 1979.

RABIES IMMUNIZING PRODUCTS

There are 2 types of immunizing products: (1) vaccines that induce an active immune response that requires time to develop (about 7 to 10 days for an antibody response) but persists for as long as a year or more and (2) globulins that provide rapid immune protection that persists for a short period of time (a half-life of about 21 days). *Both types of products should be used concurrently for rabies postexposure prophylaxis.*

Vaccines for Use in the United States

Human diploid cell rabies vaccine (HDCV)*: HDCV is an inactivated virus vaccine prepared from fixed rabies virus grown in WI-38 or MRC-5 human diploid cell tissue culture. The vaccine grown on WI-38 cells and developed in the United States is inactivated with tri-n-butyl phosphate, while that grown in MRC-5 cells and developed in Europe is inactivated with beta-propiolactone. The vaccine is supplied as 1-milliliter (ml), single-dose vials of lyophilized vaccine with accompanying diluent.

Duck embryo vaccine (DEV)†: DEV is an inactivated virus vaccine prepared from embryonated duck eggs infected with a fixed virus and inactivated with beta-propiolactone. It is supplied as 1-ml, single-dose vials of lyophilized vaccine with accompanying ampules of diluent.

Globulins

Rabies immune globulin, human (RIG): RIG is antirabies gamma globulin concentrated by cold ethanol fractionation from plasma of hyperimmunized human donors. Neutralizing antibody content is standardized to contain 150 international units (IU) per ml. It is supplied in 2-ml (300 IU) and 10-ml (1,500 IU) vials for pediatric and adult use, respectively.

Antirabies serum, equine (ARS): Antirabies serum is a refined, concentrated serum obtained from hyperimmunized horses. Neutralizing antibody content is standardized to contain 1,000 IU per vial. Volume is adjusted by the manufacturer on the basis of antibody potency in each lot. Currently a 1,000-IU vial contains approximately 5 ml.

RATIONALE FOR CHOICE OF RABIES IMMUNIZING PRODUCTS

The rationale for choosing among rabies vaccines and between the 2 globulins is based on their efficacy and safety. HDCV is the preferred rabies vaccine because of its presumed greater efficacy and because fewer adverse reactions are known to be associated with it. RIG is preferred over ARS because the latter has a higher risk of adverse reactions.

Vaccines

The effectiveness of rabies vaccines is measured by their ability to protect persons exposed to rabies and to induce antibodies to rabies virus.

HDCV has been used with RIG or ARS to treat 45 persons bitten by rabid dogs or wolves in Iran, 31 persons bitten by a variety of rabid animals in Germany, and 77 persons bitten by a variety of rabid animals in the United States. In these studies no person contracted rabies after receiving HDCV, indicating that the vaccine is effective.

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*Official name: Rabies Vaccine.

†Official name: Rabies Vaccine.

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DEV has not been evaluated for efficacy in clinical trials as has HDCV, but the accumulation of experience with DEV vaccine suggests that it is effective. From 1957 through 1978, approximately 575,000 persons (20,000-30,000 each year) were treated with DEV. These included an estimated 3,000-4,000 persons (100-200 persons each year) who were bitten by animals proven to be rabid; 14 of these treated persons died of rabies. Of the fatal cases, only 3 had received optimal treatment with both DEV and RIG or ARS; the remaining 11 had received DEV alone. Thus, the use of DEV and RIG (or ARS) was usually effective in preventing rabies.

The experience with HDCV is too limited to permit an estimate of the frequency of treatment failures to compare with that of DEV; however, the antibody response to the vaccines has been compared. The antibody response to HDCV is superior to that induced by DEV. All persons treated with at least 5 doses of HDCV and RIG have developed an adequate titer, while only 85%-90% of persons treated with 16-23 doses of DEV and RIG developed an adequate titer.‡ The average peak titer of rabies antibody after vaccination with HDCV is more than 10 times higher than that seen after DEV.

Serious adverse reactions associated with rabies vaccines include systemic, anaphylactic, and neuroparalytic reactions. Studies suggest that HDCV will have lower rates of all serious adverse reactions than are attributed to DEV. Nerve tissue vaccines of the Semple type (NTV) and suckling rodent brain vaccines—used in some foreign countries—have a higher incidence of neuroparalytic reactions than DEV.

Globulins

RIG and ARS are both effective; however, ARS causes serum sickness in over 40% of adult recipients, while RIG rarely causes adverse reactions. Thus, RIG is the product of choice when available.

RATIONALE OF TREATMENT

Physicians must evaluate individually each exposure to possible rabies infection. Local or state public health officials should be consulted if questions arise about the need for rabies prophylaxis.

In the United States the following factors should be considered before specific antirabies treatment is initiated:

Species of Biting Animal

Some animals are much more likely to be infected with rabies virus than others. For example, carnivorous wild animals (especially skunks, raccoons, foxes, coyotes, and bobcats) and bats are the animals most commonly infected with rabies and have been the cause of most of the human rabies in the United States since 1960. Unless the animal is tested and shown not to be rabid, postexposure prophylaxis should be initiated upon bite or non-bite exposure to one of these animals. (See definition in "Type of Exposure," below.) If treatment has been initiated and subsequent testing shows that the exposing animal is negative for rabies, treatment can be discontinued.

The likelihood that a domestic dog or cat would be infected with rabies varies from region to region; hence, the need for postexposure prophylaxis also varies.

Rodents (such as squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, and mice) and lagomorphs (including rabbits and hares) are rarely found to be infected with rabies

‡CDC considers an antibody titer ≥1:16 by the rapid fluorescent-focus inhibition test at CDC to be an adequate response to vaccination.

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and have not been known to cause human rabies in the United States; their bites almost never call for antirabies prophylaxis. Therefore, in these cases the state or local health department should be consulted before initiating postexposure antirabies prophylaxis.

Circumstances of Biting Incident

An *unprovoked* attack is more likely than a provoked attack to indicate that the animal is rabid. Bites inflicted on a person attempting to feed or handle an apparently healthy animal should generally be regarded as provoked.

Type of Exposure

Rabies is transmitted only by introducing the virus into open cuts or wounds in skin, or via mucous membranes. The likelihood that rabies infection will result from exposure varies with the nature and extent of exposure. Two categories of exposure should be considered.

Bite: Any penetration of the skin by teeth.

Non-bite: Scratches, abrasions, open wounds, or mucous membranes contaminated with saliva or other potentially infectious material, such as brain tissue, from a rabid animal. Casual contact, such as petting a rabid animal (without a bite or non-bite exposure as described above), does not constitute an exposure and is not an indication for prophylaxis. There have been 2 instances of airborne rabies that were acquired in the laboratory and 2 probable airborne rabies cases acquired in a bat-infested cave in Texas.

The only documented cases of rabies due to human-to-human transmission occurred in 2 patients who received corneas transplanted from persons who died of rabies undiagnosed at the time of death.

Bite and non-bite exposures from a human with rabies theoretically could transmit rabies. Although no cases of rabies acquired in this way have been documented, and the risk is obviously small, those so exposed should receive prophylaxis. Each potential exposure to human rabies should be carefully evaluated to minimize unnecessary rabies prophylaxis.

MANAGEMENT OF BITING ANIMALS

A healthy domestic dog or cat that bites a person should be confined and observed for 10 days and evaluated by a veterinarian at the first sign of illness during confinement or before release. Any illness in the animal should be reported immediately to the local health department. If signs suggestive of rabies develop, the animal should be humanely killed and its *head removed and shipped, under refrigeration,* for examination by a qualified laboratory designated by the local or state health department. Any stray or unwanted dog or cat that bites a person should be killed immediately and the head submitted, as described above, for rabies examination.

Signs of rabies in wild animals cannot be interpreted reliably; therefore, any wild animal that bites or scratches a person should be killed at once (without unnecessary damage to the head) and the brain submitted, as described above, for examination for evidence of rabies. If the brain is negative by fluorescent-antibody examination for rabies, one can assume that the saliva contains no virus, and the person bitten need not be treated.

POSTEXPOSURE PROPHYLAXIS

The essential components of rabies postexposure prophylaxis are local treatment of wounds and immunization.

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Local Treatment of Wounds

Immediate and thorough washing of all bite wounds and scratches with soap and water is perhaps the most effective measure for preventing rabies. In experimental animals, local wound-cleansing has been shown to reduce markedly the likelihood of rabies.

Tetanus prophylaxis and measures to control bacterial infection should be given as indicated.

Immunization

Postexposure antirabies immunization should always include both passively administered antibody (preferably RIG) and vaccine (preferably HDCV), with 1 exception: persons who have been previously immunized with rabies vaccine and have a documented adequate rabies antibody titer should receive only vaccine. The combination of globulin and vaccine is recommended for both bite exposures and non-bite exposures (as described under "RATIONALE OF TREATMENT") and regardless of the interval between exposure and treatment. The sooner treatment is begun after exposure, the better. However, there have been instances in which the decision to begin treatment was indicated as late as 6 months and longer after the exposure.

HDCV: HDCV is the vaccine of choice whenever available and should be administered in conjunction with RIG. (RIG is administered only once, at the beginning of postexposure therapy, as described below.) In 1977 the World Health Organization (WHO) established a recommendation for 6 intramuscular doses of HDCV based on studies in Germany and Iran of a regimen of RIG or ARS and 6 doses of HDCV. Used in this way, the vaccine was found to be safe and effective in protecting 76 persons bitten by proven rabid animals and induced an excellent antibody response in all recipients. Since 1977, studies conducted by CDC in the United States have shown that a regimen of 1 dose of RIG and 5 doses of HDCV was safe and induced an excellent antibody response in all recipients. Of 77 persons bitten by proven rabid animals and so treated, none developed rabies.

Five 1-ml doses of HDCV should be given intramuscularly (for example, in the deltoid regions). Other routes of administration, such as the intradermal route, have not been tested for postexposure prophylaxis and should not be used. The first dose should be given as soon as possible after the exposure; an additional dose should be given on each of days 3, 7, 14, and 28 after the first dose. (WHO currently recommends a sixth dose 90 days after the first dose.) A serum specimen for rabies antibody testing should be collected on day 28 (at the time the last dose is given) or 2-3 weeks after the last dose. *Testing for rabies antibody can be arranged by the state health department.*

If an adequate antibody titer is not detected, this information should be reported to the state health department or to CDC (404-329-3727), a booster dose given, and another serum specimen for rabies antibody testing collected 2-3 weeks later.

DEV: When HDCV is not available, 1 dose of RIG and 23 doses of DEV should be administered. (RIG is administered only once at the beginning of postexposure therapy, as described below.) DEV may be given as 21 daily 1-ml doses or fourteen 1-ml doses in the first 7 days (2 injections given at separate sites simultaneously) and then seven 1-ml daily doses. These 21 doses should be followed by 2 "booster" doses, the first 10 days after the 21st dose, and the second 10 days later. Vaccine should be injected subcutaneously in the abdomen, lower back, or lateral aspect of the thigh; rotation of sites is recommended.

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All persons who receive DEV should have serum for rabies antibody testing collected at the time of the second booster. If no antibody is detected, it is imperative that HDCV be obtained and that 3 doses (1 each on days 0, 7, and 14) be given. Serum should be collected 2-3 weeks after the last injection for further antibody testing.

Combinations of vaccines: One rabies vaccine can be used to complete postexposure prophylaxis begun with another vaccine. For example, if treatment is begun with DEV and HDCV becomes available: After 1-3 doses of DEV, 5 doses of HDCV should be given (1 on each of days 0, 3, 7, 14, and 28); after 4-7 doses of DEV, 4 doses of HDCV (1 on each of days 0, 7, 14, and 28); and after 8 or more doses of DEV, 3 doses of HDCV (1 on each of days 0, 7, and 14). Serum should be collected for antibody testing 2-3 weeks after the last dose has been given.

RIG (or ARS if RIG is not available): RIG is administered only once, at the beginning of antirabies prophylaxis, to provide antibodies until the patient responds to vaccination. If RIG inadvertently was not given when vaccination was begun, it can be given up to the eighth day after the first dose of vaccine was given. From about the eighth day on, RIG is unnecessary because presumably an active antibody response to the vaccine has occurred. The recommended dose of RIG is 20 IU/kg or approximately 9 IU/lb body weight. (When ARS must be used, the recommended dose is 40 IU/kg, approximately 18 IU/lb or 1 vial of 1,000 IU/55-lb body weight.) If possible, up to half the dose of RIG should be thoroughly infiltrated in the area around the wound, and the rest should be administered intramuscularly. Because RIG may partially suppress active production of antibody, no more than the recommended dose of RIG should be given.

These recommendations are summarized in Tables 1 and 2 at the end of this statement.

PRE-EXPOSURE IMMUNIZATION

The relatively low frequency of severe reactions to DEV, and even lower frequency following HDCV, make it practical to offer pre-exposure immunization to persons in high-risk groups: veterinarians, animal handlers, certain laboratory workers, and persons—especially children—living in or visiting countries where rabies is a constant threat. Persons whose vocational or avocational pursuit bring them into contact with potentially rabid dogs, cats, foxes, skunks, bats, or other species at risk of having rabies should also be considered for pre-exposure prophylaxis.

Pre-exposure prophylaxis is given for several reasons. First, it may provide protection to persons with inapparent exposures to rabies. Second, it protects persons whose post-exposure therapy might be expected to be delayed. Finally, although it does not eliminate the need for additional therapy after a rabies exposure, it simplifies that therapy by eliminating the need for globulin and decreasing the number of doses of vaccine needed. The last advantage is of particular importance for persons at high risk of being exposed in countries where the available rabies immunizing products may carry a higher risk of adverse reactions.

HDCV: This is the vaccine of choice whenever available. Three 1-ml injections of HDCV should be given intramuscularly (for example, in the deltoid area), 1 on each of days 0, 7, and 21 or 28. In a study in the United States, more than 1,000 persons received HDCV according to this regimen. Antibody was demonstrated in the sera of all subjects when tested by the rapid fluorescent-focus inhibition test, and in the sera of 98.4% of them when tested by the mouse neutralization method. Other studies have produced

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comparable results. All who receive pre-exposure immunization should have serum for rabies antibody testing collected 2-3 weeks after the last injection. *Testing for rabies antibody can be arranged through the state health department.* If the antibody response is not adequate, a booster dose should be given and serum collected for antibody testing 2-3 weeks later. If the antibody response is still inadequate, this should be reported to the state health department and/or CDC, an additional booster dose given, and serum for rabies antibody testing collected 2-3 weeks later.

DEV: Two 1-ml injections of DEV given subcutaneously (for example, in the deltoid area) 1 month apart should be followed by a dose 6-7 months after the second dose. For more rapid immunization, 3 injections of DEV, 1 ml each, can be given at weekly intervals, with a fourth dose 3 months later. The sera of 80%-90% of persons receiving DEV according to these schedules demonstrate antibodies. All who receive pre-exposure vaccination should have serum for rabies antibody testing collected 2-3 weeks after the last injection. If the antibody response is not adequate, 2 booster doses of DEV (or preferably HDCV), 1 each on days 0 and 7, can be given and serum for rabies antibody testing collected 2-3 weeks later. When the antibody response is still inadequate, notify the local or state health department or CDC, give an additional booster dose, and collect another serum 2-3 weeks later for rabies antibody testing.

Booster doses of vaccine: Persons with continuing risk of exposure should receive a booster dose (1 ml) every 2 years or have their serum tested for rabies antibody every 2 years and, if the titer is inadequate, have a booster dose. Persons who work with live rabies virus in research laboratories or vaccine production facilities and are at risk of inapparent exposure should have the rabies antibody titer of their serum determined every 6 months; booster doses of vaccine should be given, as needed, to maintain an adequate titer. Other laboratory workers, such as those doing rabies diagnostic tests, should have boosters every 2 years or have their serum tested for rabies antibody every 2 years and, if the titer is inadequate, have a booster dose.

Postexposure therapy of previously immunized persons: When an immunized person with previously demonstrated rabies antibody is exposed to rabies, that person should receive 2 doses (1 ml each) of HDCV, 1 immediately and 1 three days later, or 5 daily doses (1 ml) of DEV plus a booster dose (1 ml) 20 days after the fifth daily dose. Passive immunization should not be given in these cases. If the immune status of a previously vaccinated person is not known, full primary postexposure antirabies treatment (RIG plus either 5 doses of HDCV or 23 doses of DEV) may be necessary. In such cases, if antibody can be demonstrated in a serum sample collected before vaccine is given, treatment can be discontinued after at least 2 doses of HDCV or 5 doses of DEV. If DEV is being used, a booster dose 20 days after the fifth dose should also be given. All persons should have serum tested for rabies antibody 2-3 weeks after the last dose.

ACCIDENTAL INOCULATION WITH MODIFIED LIVE RABIES VIRUS (MLV) VACCINES FOR ANIMALS

Individuals may be accidentally exposed to attenuated rabies virus while administering modified live rabies virus (MLV) vaccines to animals. While there have been no reported human rabies cases that resulted from exposure to needle sticks or sprays with licensed MLV vaccines, vaccine-induced rabies has been observed in animals given MLV vaccines. Absolute assurance of a lack of risk for humans, therefore, cannot be given. The best evidence for a low risk, however, is the absence of recognized cases of vaccine-associated

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disease in humans despite frequent accidental exposures.

Currently available MLV animal vaccines are made with 1 of 3 attenuated strains of rabies virus: high egg passage (HEP) Flury strain; Street Alabama Dufferin (SAD) strain; or Kissling strain. The HEP Flury and SAD strains of virus have been used in animal vaccines for over 10 years without evidence of associated disease in humans; therefore, postexposure treatment is not recommended following exposure to these types of vaccine by needle sticks or sprays. The Kissling strain has been used in vaccines only since 1975. No disease caused by an exposure to this strain has been observed in humans; however, because of the more limited experience with it, postexposure treatment is currently recommended following exposures to vaccine prepared with the Kissling strain.

It should be emphasized that there are insufficient data to assess the true risk associated with any of the MLV vaccines. Therefore, pre-exposure immunization, documented antibody response, and periodic boosters are recommended for all persons dealing with potentially rabid animals or frequently handling animal rabies vaccines.

ADVERSE REACTIONS

HDCV

Reactions after vaccination with HDCV are less common than with DEV. In a study using 5 doses of HDCV, local reactions, such as pain, erythema, and swelling or itching at the injection site, were reported in about 25% of recipients of HDCV, and mild systemic

(Continued on page 277)

TABLE I. Summary — cases of specified notifiable diseases, United States

[Cumulative totals include revised and delayed reports through previous weeks.]

DISEASE	23rd WEEK ENDING		MEDIAN 1975-1979	CUMULATIVE, FIRST 23 WEEKS		
	June 7, 1980	June 9, 1979		June 7, 1980	June 9, 1979	MEDIAN 1975-1979
Aseptic meningitis	66	77	59	1,354	1,168	903
Brucellosis	2	1	2	73	44	81
Chickenpox	6,814	5,201	5,304	133,488	153,013	134,663
Diphtheria	–	–	–	2	4	47
Encephalitis: Primary (arthropod-borne & unspec.)	9	15	16	256	223	273
Post-infectious	7	9	8	80	110	110
Hepatitis, Viral: Type B	344	264	334	7,199	6,103	6,541
Type A	502	497	582	11,525	12,858	14,060
Type unspecified	198	199	191	5,089	4,413	3,760
Malaria	51	26	15	720	232	182
Measles (rubeola)	626	570	1,191	10,214	9,490	18,434
Meningococcal infections: Total	42	56	32	1,410	1,445	970
Civilian	42	56	32	1,404	1,430	965
Military	–	–	–	6	15	15
Mumps	223	279	640	6,030	9,071	13,288
Pertussis	17	13	18	460	534	532
Rubella (German measles)	119	337	657	2,590	8,852	13,003
Tetanus	1	4	3	22	24	25
Tuberculosis	554	566	643	11,711	11,889	13,190
Tularemia	5	4	4	42	65	51
Typhoid fever	5	16	9	151	191	152
Typhus fever, tick-borne (Rky. Mt. spotted)	51	59	48	201	202	185
Venereal diseases:						
Gonorrhea: Civilian	17,223	17,692	18,595	412,546	416,049	413,554
Military	596	577	707	11,590	12,103	12,103
Syphilis, primary & secondary: Civilian	367	457	448	11,378	10,577	13,577
Military	2	6	6	141	136	137
Rabies in animals	122	103	70	2,857	2,107	1,296

TABLE II. Notifiable diseases of low frequency, United States

	CUM. 1980		CUM. 1980
Anthrax	–	Poliomyelitis: Total	5
Botulism	20	Paralytic (Md. 1)	3
Cholera	8	Psittacosis (Nev. 1, Calif. 1)	32
Congenital rubella syndrome	38	Rabies in man	–
Leprosy (Mass. 1, Tex. 1, Hawaii 1)	76	Trichinosis (Mich. 1)	47
Leptospirosis	23	Typhus fever, flea-borne (endemic, murine)	20
Plague	1		

All delayed reports and corrections will be included in the following week's cumulative totals.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending June 7, 1980, and June 9, 1979 (23rd week)

REPORTING AREA	ASEPTIC MENINGITIS	BRUCELLOSIS	CHICKEN-POX	DIPHTHERIA		ENCEPHALITIS			HEPATITIS (VIRAL), BY TYPE			MALARIA	
						Primary		Post-infectious	B	A	Unspecified		
	1980	1980	1980	1980	CUM. 1980	1980	1979	1980	1980	1980	1980	1980	CUM. 1980
UNITED STATES	66	2	6,814	–	2	9	15	7	344	502	198	51	720
NEW ENGLAND	2	–	989	–	–	–	2	–	5	9	7	5	59
Maine	–	–	178	–	–	–	–	–	–	1	–	–	12
N.H.	–	–	95	–	–	–	–	–	–	–	–	–	6
Vt.	–	–	23	–	–	–	–	–	–	2	–	–	–
Mass.	–	–	370	–	–	–	1	–	1	3	7	1	27
R.I.	1	–	26	–	–	–	–	–	1	1	–	2	6
Conn.	1	–	297	–	–	–	1	–	3	2	–	2	8
MID. ATLANTIC	3	–	567	–	1	2	2	1	56	41	13	6	96
Upstate N.Y.	2	–	230	–	–	1	1	–	5	11	4	–	17
N.Y. City	1	–	267	–	1	1	1	–	10	4	1	1	28
N.J.	NA	–	NN	–	–	–	–	–	23	19	6	2	26
Pa.	–	–	70	–	–	–	–	1	18	7	2	3	25
E.N. CENTRAL	3	1	3,377	–	1	2	–	–	34	65	16	–	27
Ohio	–	–	219	–	–	–	–	–	7	10	7	–	5
Ind.	–	–	206	–	–	–	–	–	6	11	–	–	3
Ill.	–	–	870	–	–	–	–	–	4	10	4	–	5
Mich.	3	–	1,261	–	1	2	–	–	14	25	2	–	10
Wis.	–	1	821	–	–	–	–	–	3	9	3	–	4
W.N. CENTRAL	3	–	476	–	–	1	–	1	9	21	7	3	30
Minn.	–	–	–	–	–	–	–	–	2	7	–	2	13
Iowa	–	–	150	–	–	1	–	–	3	1	2	1	3
Mo.	1	–	4	–	–	–	–	–	3	8	4	–	7
N. Dak.	–	–	28	–	–	–	–	–	–	–	–	–	–
S. Dak.	–	–	2	–	–	–	–	–	–	–	–	–	1
Nebr.	–	–	58	–	–	–	–	–	–	–	–	–	3
Kans.	2	–	234	–	–	–	–	1	1	5	1	–	3
S. ATLANTIC	19	–	517	–	–	2	7	2	75	89	28	7	81
Del.	–	–	36	–	–	–	–	–	1	–	1	–	–
Md.	1	–	136	–	–	–	4	–	9	3	9	–	15
D.C.	–	–	3	–	–	–	–	–	1	–	–	–	1
Va.	–	–	15	–	–	–	1	–	10	3	1	3	30
W. Va.	–	–	153	–	–	–	–	–	–	2	1	1	3
N.C.	5	–	NN	–	–	1	2	–	8	10	5	1	5
S.C.	–	–	24	–	–	1	–	–	10	3	1	–	3
Ga.	–	–	1	–	–	–	–	–	21	16	–	1	11
Fla.	13	–	149	–	–	–	–	2	15	52	10	1	13
E.S. CENTRAL	4	–	165	–	–	–	1	1	21	30	3	–	6
Ky.	–	–	81	–	–	–	–	–	4	11	1	–	2
Tenn.	4	–	NN	–	–	–	1	1	9	5	–	–	–
Ala.	–	–	80	–	–	–	–	–	5	6	2	–	4
Miss.	–	–	4	–	–	–	–	–	3	8	–	–	–
W.S. CENTRAL	8	1	323	–	–	–	–	1	26	80	52	7	81
Ark.	2	1	3	–	–	–	–	–	2	9	1	1	5
La.	1	–	NN	–	–	–	–	–	–	1	2	4	33
Okla.	–	–	–	–	–	–	–	1	2	2	10	1	9
Tex.	5	–	320	–	–	–	–	–	22	68	39	1	34
MOUNTAIN	2	–	66	–	–	1	–	–	11	26	14	1	31
Mont.	–	–	13	–	–	–	–	–	–	–	–	–	–
Idaho	–	–	–	–	–	–	–	–	–	–	–	–	–
Wyo.	–	–	–	–	–	–	–	–	–	–	1	–	2
Colo.	2	–	41	–	–	1	–	–	7	7	4	–	17
N. Mex.	–	–	–	–	–	–	–	–	–	1	–	1	2
Ariz.	NA	NA	NN	NA	–	NA	–	–	NA	NA	NA	NA	8
Utah	–	–	–	–	–	–	–	–	–	4	2	–	–
Nev.	–	–	12	–	–	–	–	–	4	14	7	–	2
PACIFIC	22	–	334	–	–	1	3	1	107	141	58	22	309
Wash.	–	–	277	–	–	–	–	–	5	14	3	–	28
Oreg.	1	–	–	–	–	1	–	–	11	13	2	4	19
Calif.	14	–	–	–	–	–	3	1	90	111	53	18	252
Alaska	–	–	17	–	–	–	–	–	–	2	–	–	3
Hawaii	7	–	40	–	–	–	–	–	1	1	–	–	7
Guam	NA	NA	NA	NA	–	NA	–	–	NA	NA	NA	NA	1
P.R.	–	–	10	–	–	–	–	–	–	–	–	–	1
V.I.	NA	NA	NA	NA	–	NA	–	–	NA	NA	NA	NA	–
Pac. Trust Terr.	NA	NA	NA	NA	–	NA	–	–	NA	NA	NA	NA	–

NN: Not notifiable. NA: Not available.
All delayed reports and corrections will be included in the following week's cumulative totals.

TABLE III (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending June 7, 1980, and June 9, 1979 (23rd week)

REPORTING AREA	MEASLES (RUBEOLA)			MENINGOCOCCAL INFECTIONS TOTAL			MUMPS		PERTUSSIS	RUBELLA		TETANUS
	1980	CUM. 1980	CUM. 1979	1980	CUM. 1980	CUM. 1979	1980	CUM. 1980	1980	1980	CUM. 1980	CUM. 1980
UNITED STATES	626	10,214	9,490	42	1,410	1,445	223	6,030	17	119	2,590	22
NEW ENGLAND	17	599	245	2	83	70	10	512	–	11	183	–
Maine	4	29	11	–	3	2	8	275	–	–	66	–
N.H.	9	281	26	–	6	8	1	15	–	–	29	–
Vt.	2	225	93	1	10	4	–	5	–	2	3	–
Mass.	1	42	11	–	28	22	–	111	–	9	66	–
R.I.	–	2	102	1	7	4	1	17	–	–	7	–
Conn.	1	20	2	–	29	30	–	89	–	–	12	–
MID. ATLANTIC	181	3,137	980	5	258	205	17	678	1	14	394	2
Upstate N.Y.	31	585	445	3	87	74	1	78	1	6	152	1
N.Y. City	70	877	467	1	72	53	4	56	–	6	73	–
N.J.	29	667	47	–	49	54	2	83	–	–	61	–
Pa.	51	1,008	21	1	50	24	10	461	–	2	108	1
E.N. CENTRAL	195	1,666	2,414	1	148	142	82	2,328	4	27	652	–
Ohio	33	187	139	–	55	51	24	1,007	–	2	4	–
Ind.	–	79	155	–	27	31	2	89	1	11	269	–
Ill.	11	260	1,156	–	19	3	20	274	1	–	141	–
Mich.	24	216	594	–	38	41	30	714	1	7	117	–
Wis.	127	924	370	1	9	16	6	244	1	7	121	–
W.N. CENTRAL	58	1,150	1,228	1	50	46	21	221	5	34	196	3
Minn.	58	939	810	1	16	9	10	20	5	24	48	2
Iowa	–	–	14	–	5	5	1	35	–	1	4	–
Mo.	–	61	350	–	18	24	–	66	–	–	38	–
N. Dak.	–	–	10	–	1	1	–	3	–	–	5	–
S. Dak.	–	–	1	–	4	2	–	1	–	–	–	–
Nebr.	–	80	–	–	–	–	–	9	–	–	–	–
Kans.	–	70	43	–	6	5	10	87	–	9	101	1
S. ATLANTIC	94	1,631	1,465	9	338	371	28	779	3	6	255	5
Del.	–	1	1	–	2	5	–	36	–	–	–	–
Md.	9	46	7	1	33	27	16	250	–	–	49	–
D.C.	–	–	–	–	1	–	1	3	–	–	–	–
Va.	24	292	198	–	32	52	1	47	–	1	47	1
W. Va.	–	15	48	–	11	6	2	60	–	3	17	1
N.C.	1	107	102	3	68	52	3	77	1	–	40	–
S.C.	5	137	132	1	43	46	2	196	1	–	49	2
Ga.	41	710	337	1	63	56	–	1	1	–	–	–
Fla.	14	323	640	3	85	127	3	109	–	2	53	1
E.S. CENTRAL	24	274	137	6	137	110	32	757	–	2	73	3
Ky.	5	47	22	–	46	19	27	676	–	1	34	1
Tenn.	15	145	46	5	37	35	1	22	–	1	34	1
Ala.	4	21	50	1	33	26	2	13	–	–	4	1
Miss.	–	61	19	–	21	30	2	46	–	–	1	–
W.S. CENTRAL	11	830	824	10	162	231	9	208	1	2	89	3
Ark.	4	11	7	1	13	20	3	19	–	–	2	1
La.	–	13	224	8	62	88	5	62	–	–	8	1
Okla.	6	688	22	1	14	22	–	–	–	–	2	–
Tex.	1	118	571	–	73	101	1	127	1	2	77	1
MOUNTAIN	6	237	247	3	46	62	5	147	–	–	80	–
Mont.	–	1	49	–	2	5	–	45	–	–	22	–
Idaho	–	–	4	–	4	4	–	11	–	–	12	–
Wyo.	–	–	36	–	2	1	–	–	–	–	–	–
Colo.	1	15	32	1	12	4	5	35	–	–	4	–
N. Mex.	–	2	32	1	7	4	–	–	–	–	5	–
Ariz.	NA	166	68	–	6	30	NA	21	NA	NA	14	–
Utah	5	46	15	–	2	6	–	26	–	–	19	–
Nev.	–	7	11	1	11	8	–	9	–	–	4	–
PACIFIC	40	690	1,950	5	188	208	19	400	3	23	668	6
Wash.	4	157	1,061	–	33	31	4	113	–	4	63	–
Oreg.	–	1	48	–	37	15	–	48	1	–	42	–
Calif.	36	522	766	5	116	150	15	223	1	19	559	6
Alaska	–	5	16	–	2	4	–	10	1	–	2	–
Hawaii	–	5	59	–	–	8	–	6	–	–	2	–
Guam	NA	3	3	–	1	1	NA	3	NA	NA	–	–
P.R.	1	64	250	–	7	–	1	105	–	–	10	6
V.I.	NA	5	4	–	1	3	NA	2	NA	NA	–	–
Pac. Trust Terr.	NA	3	6	–	–	1	NA	8	NA	NA	1	–

NA: Not available.

All delayed reports and corrections will be included in the following week's cumulative totals.

TABLE III (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending June 7, 1980, and June 9, 1979 (23rd week)

REPORTING AREA	TUBERCULOSIS		TULAREMIA	TYPHOID FEVER		TYPHUS FEVER (Tick-borne) (RMSF)		VENEREAL DISEASES (Civilian)						RABIES (in Animals)
								GONORRHEA			SYPHILIS (Pri. & Sec.)			
	1980	CUM. 1980	CUM. 1980	1980	CUM. 1980	1980	CUM. 1980	1980	CUM. 1980	CUM. 1979	1980	CUM. 1980	CUM. 1979	CUM. 1980
UNITED STATES	554	11,711	42	5	151	51	201	17,223	412,546	416,049	367	11,378	10,577	2,857
NEW ENGLAND	16	323	–	–	4	2	3	539	10,662	10,678	7	296	197	22
Maine	2	25	–	–	–	–	–	44	634	732	–	4	5	16
N.H.	–	6	–	–	–	–	–	18	350	376	–	–	12	1
Vt.	1	10	–	–	–	–	–	9	255	236	–	3	–	–
Mass.	8	169	–	–	2	–	1	163	4,326	4,333	4	190	121	1
R.I.	1	36	–	–	1	1	1	41	646	862	–	13	6	–
Conn.	4	77	–	–	1	1	1	264	4,451	4,139	3	86	53	4
MID. ATLANTIC	86	1,976	1	–	40	1	8	2,219	45,183	44,326	66	1,646	1,607	13
Upstate N.Y.	5	373	–	–	5	1	2	435	8,383	7,037	7	135	114	7
N.Y. City	33	716	1	–	17	–	–	748	17,685	17,497	46	1,083	1,087	–
N.J.	17	406	–	–	8	–	5	697	8,307	8,451	3	209	222	2
Pa.	31	481	–	–	10	–	1	339	10,808	11,341	10	219	184	4
E.N. CENTRAL	88	1,686	1	–	11	–	2	2,468	64,307	64,964	36	1,088	1,461	436
Ohio	14	289	–	–	4	–	2	578	17,245	17,810	10	173	274	18
Ind.	9	183	–	–	–	–	–	130	6,284	5,647	1	89	80	46
Ill.	34	617	–	–	3	–	–	819	20,132	20,791	20	603	895	261
Mich.	24	499	1	–	3	–	–	614	14,286	14,919	3	177	166	2
Wis.	7	98	–	–	1	–	–	327	6,360	5,797	2	46	46	109
W.N. CENTRAL	37	412	8	–	3	2	4	713	18,368	20,136	3	129	137	887
Minn.	9	59	1	–	1	–	–	85	3,066	3,430	1	45	42	79
Iowa	4	36	1	–	–	–	–	83	2,013	2,500	–	8	21	179
Mo.	17	196	5	–	–	1	3	292	7,846	8,574	1	64	51	243
N. Dak.	3	23	–	–	–	–	–	10	268	340	–	–	1	96
S. Dak.	–	22	–	–	1	–	–	24	562	698	–	1	1	157
Nebr.	1	21	1	–	–	–	–	49	1,539	1,347	–	4	2	43
Kans.	3	55	–	–	1	1	1	170	3,074	3,247	1	7	19	90
S. ATLANTIC	116	2,690	7	–	20	38	134	4,109	101,048	99,617	104	2,704	2,520	185
Del.	1	37	–	–	1	–	–	88	1,413	1,626	1	7	16	–
Md.	29	363	1	–	2	13	22	535	10,643	12,051	9	187	175	–
D.C.	10	150	–	–	3	–	–	209	7,099	6,389	4	185	193	–
Va.	19	308	–	–	3	–	15	444	8,781	9,615	11	245	240	5
W. Va.	–	102	–	–	1	–	1	46	1,203	1,429	1	11	38	3
N.C.	24	452	2	–	1	16	62	608	15,010	14,724	5	194	208	5
S.C.	18	246	–	–	3	9	29	320	9,657	9,185	4	140	115	32
Ga.	15	360	4	–	–	–	3	804	19,017	19,370	25	807	682	101
Fla.	–	672	–	–	6	–	2	1,055	28,225	25,228	44	928	853	39
E.S. CENTRAL	48	1,068	6	1	6	3	16	1,255	33,640	35,777	46	914	684	162
Ky.	13	228	–	–	2	1	2	286	4,983	4,630	2	70	68	71
Tenn.	10	360	6	–	–	1	9	515	11,835	12,624	26	373	287	73
Ala.	15	297	–	–	1	1	4	207	9,900	10,773	11	184	139	18
Miss.	10	183	–	1	3	–	1	247	6,922	7,750	7	287	190	–
W.S. CENTRAL	65	1,175	13	–	16	3	30	2,410	53,497	53,944	53	2,201	1,860	829
Ark.	10	117	11	–	–	1	6	144	3,961	4,195	1	73	56	104
La.	7	215	–	–	–	–	–	310	9,382	9,484	–	509	440	6
Okla.	9	120	1	–	1	2	15	271	5,328	4,950	–	39	34	137
Tex.	39	723	1	–	15	–	9	1,685	34,826	35,315	52	1,580	1,330	582
MOUNTAIN	5	306	4	–	9	2	4	521	15,731	16,516	3	278	200	74
Mont.	–	11	1	–	1	–	1	16	572	835	–	1	6	9
Idaho	–	10	1	–	1	1	1	20	731	695	–	16	14	–
Wyo.	–	15	–	–	–	1	1	27	462	368	–	7	5	–
Colo.	4	38	1	–	2	–	–	145	4,203	4,396	1	66	47	–
N. Mex.	–	66	–	–	1	–	–	85	1,969	2,135	–	52	36	21
Ariz.	NA	131	1	NA	2	NA	–	NA	4,219	4,588	NA	93	60	44
Utah	1	20	–	–	2	–	1	38	751	861	–	5	3	–
Nev.	–	15	–	–	–	–	–	190	2,824	2,638	2	38	29	–
PACIFIC	93	2,075	2	4	42	–	–	2,989	70,110	70,091	49	2,122	1,911	249
Wash.	12	171	–	–	–	–	–	115	5,445	5,934	NA	91	113	–
Oreg.	7	87	–	1	5	–	–	251	4,966	4,416	4	48	83	–
Calif.	60	1,760	2	3	37	–	–	2,509	56,521	56,285	35	1,895	1,658	206
Alaska	–	24	–	–	–	–	–	63	1,675	2,293	–	4	12	43
Hawaii	14	33	–	–	–	–	–	51	1,503	1,163	10	84	45	–
Guam	NA	15	–	NA	–	NA	–	NA	31	44	NA	–	–	–
P.R.	11	71	–	–	1	–	–	65	1,148	923	18	246	215	25
V.I.	NA	–	–	NA	–	NA	–	NA	83	84	NA	10	4	–
Pac. Trust Terr.	NA	23	–	NA	–	NA	–	NA	181	218	NA	–	1	–

NA: Not available.

All delayed reports and corrections will be included in the following week's cumulative totals.

TABLE IV. Deaths in 121 U.S. cities,* week ending June 7, 1980 (23rd week)

REPORTING AREA	ALL CAUSES, BY AGE (YEARS)					P&I** TOTAL
	ALL AGES	>65	45-64	25-44	<1	
NEW ENGLAND	711	468	166	34	24	31
Boston, Mass.	211	133	48	14	8	10
Bridgeport, Conn.	52	31	15	4	2	1
Cambridge, Mass.	25	17	6	1	1	1
Fall River, Mass.	33	26	6	–	1	–
Hartford, Conn.	54	37	10	3	4	1
Lowell, Mass.	28	18	7	2	1	–
Lynn, Mass.	26	20	5	–	–	1
New Bedford, Mass.	28	20	6	1	–	1
New Haven, Conn.	48	28	14	1	2	1
Providence, R.I.	83	49	22	5	3	6
Somerville, Mass.	3	3	–	–	–	1
Springfield, Mass.	32	25	6	–	1	2
Waterbury, Conn.	23	15	6	1	–	2
Worcester, Mass.	65	46	15	2	1	4
MID. ATLANTIC	2,600	1,647	623	174	76	107
Albany, N.Y.	62	37	13	2	9	1
Allentown, Pa.	26	17	8	1	–	–
Buffalo, N.Y.	103	62	31	5	2	12
Camden, N.J.	34	20	8	4	2	–
Elizabeth, N.J.	27	19	7	1	–	1
Erie, Pa.†	31	21	7	1	1	2
Jersey City, N.J.	55	25	20	5	4	1
Newark, N.J.	54	26	18	4	5	7
N.Y. City, N.Y.	1,464	944	327	116	33	49
Paterson, N.J.	25	18	1	2	3	1
Philadelphia, Pa.†	305	174	88	21	5	11
Pittsburgh, Pa.†	79	56	22	–	1	–
Reading, Pa.	32	24	6	2	–	3
Rochester, N.Y.	114	80	23	3	5	12
Schenectady, N.Y.	22	14	7	1	–	1
Scranton, Pa.†	29	19	9	–	–	1
Syracuse, N.Y.	56	32	15	2	4	1
Trenton, N.J.	27	18	5	2	1	2
Utica, N.Y.	22	18	2	1	–	1
Yonkers, N.Y.	33	23	6	1	1	1
E.N. CENTRAL	2,247	1,406	537	138	86	54
Akron, Ohio	66	47	10	3	4	–
Canton, Ohio	42	31	9	2	–	1
Chicago, Ill.	494	306	112	37	20	17
Cincinnati, Ohio	146	94	36	5	4	8
Cleveland, Ohio	162	87	43	12	16	–
Columbus, Ohio	134	85	31	8	1	1
Dayton, Ohio	104	65	27	8	2	6
Detroit, Mich.	265	160	59	25	15	2
Evansville, Ind.	38	24	10	2	1	–
Fort Wayne, Ind.	50	29	16	2	2	2
Gary, Ind.	13	8	4	1	–	–
Grand Rapids, Mich.	53	38	11	–	2	1
Indianapolis, Ind.	173	94	49	12	9	1
Madison, Wis.	50	31	13	3	1	4
Milwaukee, Wis.	168	116	39	4	4	6
Peoria, Ill.	41	30	7	–	3	2
Rockford, Ill.	38	23	10	2	1	–
South Bend, Ind.	33	21	6	3	–	3
Toledo, Ohio	113	75	26	7	1	–
Youngstown, Ohio	64	42	19	2	–	–
W.N. CENTRAL	764	508	145	52	27	27
Des Moines, Iowa	51	35	8	6	1	5
Duluth, Minn.	26	20	6	–	–	3
Kansas City, Kans.	31	19	5	4	1	1
Kansas City, Mo.	107	70	17	7	3	1
Lincoln, Nebr.	53	44	3	3	1	2
Minneapolis, Minn.	100	65	17	11	4	3
Omaha, Nebr.	101	62	23	6	7	1
St. Louis, Mo.	192	117	46	14	8	7
St. Paul, Minn.	60	47	10	–	1	1
Wichita, Kans.	43	29	10	1	1	3
S. ATLANTIC	1,318	763	352	91	63	47
Atlanta, Ga.	156	89	38	13	12	5
Baltimore, Md.	283	154	90	17	8	4
Charlotte, N.C.	78	38	24	4	7	4
Jacksonville, Fla.	84	52	17	9	2	3
Miami, Fla.	72	35	24	7	4	2
Norfolk, Va.	56	29	16	3	3	2
Richmond, Va.	84	51	25	5	2	7
Savannah, Ga.	29	17	8	3	–	3
St. Petersburg, Fla.	103	88	11	1	3	6
Tampa, Fla.	74	49	19	–	2	6
Washington, D.C.	228	117	60	23	20	5
Wilmington, Del.	71	44	20	6	–	–
E.S. CENTRAL	682	414	172	51	28	36
Birmingham, Ala.	97	50	26	13	5	–
Chattanooga, Tenn.	63	36	13	7	5	4
Knoxville, Tenn.	39	30	7	1	–	2
Louisville, Ky.	119	73	28	9	7	12
Memphis, Tenn.	138	78	43	11	2	8
Mobile, Ala.	84	55	21	3	3	3
Montgomery, Ala.	38	30	2	4	1	3
Nashville, Tenn.	104	62	32	3	5	4
W.S. CENTRAL	1,292	706	356	104	60	43
Austin, Tex.	59	31	17	4	3	6
Baton Rouge, La.	46	31	8	2	3	1
Corpus Christi, Tex.	46	34	7	4	–	–
Dallas, Tex.	207	102	60	18	13	1
El Paso, Tex.	47	23	18	5	–	2
Fort Worth, Tex.	100	58	29	8	–	8
Houston, Tex.	335	174	86	36	22	10
Little Rock, Ark.	85	46	26	5	4	5
New Orleans, La.	119	66	39	5	7	–
San Antonio, Tex.	142	77	35	11	6	6
Shreveport, La.	22	13	8	1	–	1
Tulsa, Okla.	84	51	23	5	2	3
MOUNTAIN	624	387	129	50	26	16
Albuquerque, N.Mex.	77	53	13	5	3	6
Colo. Springs, Colo.	35	18	10	4	1	5
Denver, Colo.	139	79	33	13	9	2
Las Vegas, Nev.	52	29	15	4	2	–
Ogden, Utah	24	16	5	1	2	1
Phoenix, Ariz.	143	92	24	12	3	1
Pueblo, Colo.	25	18	6	1	–	–
Salt Lake City, Utah	48	26	10	3	5	1
Tucson, Ariz.	81	56	13	7	1	–
PACIFIC	1,809	1,208	394	102	53	51
Berkeley, Calif.	24	19	4	1	–	–
Fresno, Calif.	70	47	15	5	1	6
Glendale, Calif.	30	25	4	–	1	–
Honolulu, Hawaii	65	42	10	8	3	4
Long Beach, Calif.	105	77	19	3	3	5
Los Angeles, Calif.	535	347	126	32	15	8
Oakland, Calif.	69	43	14	6	3	4
Pasadena, Calif.	32	23	7	–	–	1
Portland, Oreg.	125	87	21	7	5	2
Sacramento, Calif.	56	38	13	1	3	2
San Diego, Calif.	140	85	31	13	6	1
San Francisco, Calif.	169	118	40	6	1	6
San Jose, Calif.	129	90	27	8	2	2
Seattle, Wash.	158	97	42	8	5	4
Spokane, Wash.	55	34	15	3	3	4
Tacoma, Wash.	47	36	6	1	2	2
TOTAL	12,047	7,507	2,874	796	443	412

*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 4 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

Rabies Prevention — Continued

reactions, such as headache, nausea, abdominal pain, muscle aches, and dizziness, were reported in about 20% of recipients. No serious anaphylactic, systemic, or neuroparalytic reactions have been reported, but additional experience with this vaccine is needed to define more clearly the risk of these adverse reactions.

DEV

Local reactions to postexposure treatment with DEV are very common. Most patients experience pain, erythema, and induration at the injection site. Approximately 13% have itching at the site. Systemic symptoms (fever, malaise, myalgia) occur in 33% of patients, usually after 5-8 doses. Anaphylaxis, which develops in less than 1% of persons receiving DEV, may occur after the first dose, particularly in persons previously sensitized with vaccines containing avian tissue. Neuroparalytic reactions occur rarely with DEV. Between 1958 and 1975, 21 neuroparalytic reactions were reported among an estimated 512,000 recipients of DEV (1/24,400), including 5 cases of transverse myelitis, 7 cases of cranial or peripheral neuropathy, and 9 cases of encephalopathy (2 fatal).

Vaccines in Other Countries

Many developing countries use inactivated nerve tissue vaccines (NTV) or inactivated suckling rodent brain vaccine (SRBV). NTV is reported to provoke neuroparalytic reactions at a rate of about 1/2,000 vaccinees; the rate for SRBV is about 1/8,000.

RIG

Local pain and low-grade fever may follow receipt of RIG. Although not reported specifically for RIG, angioneurotic edema, nephrotic syndrome, and anaphylaxis have been reported after injection of immune serum globulin (ISG). These reactions occur so rarely that the causal relationship between ISG and these reactions is not clear.

ARS

ARS produces serum sickness in at least 40% of adult recipients; reaction rates for children are lower. Anaphylactic reactions may occur. When RIG is not available and ARS must be used, the patient should be tested for sensitivity to equine serum. (In rare instances the sensitivity test has induced anaphylactic reactions.)

Because adverse reactions are associated more frequently with ARS than with RIG, and ARS might sensitize recipients to equine protein, ARS should be used only when RIG cannot be obtained.

Management of Adverse Reactions

Once initiated, rabies prophylaxis should not be interrupted or discontinued because of local, or mild systemic, adverse reactions to rabies vaccine. Usually such reactions can be successfully managed with anti-inflammatory and antipyretic agents (aspirin, for example).

When a person with a history of hypersensitivity must be given rabies vaccines (for example, when an egg-sensitive person must receive DEV), antihistamines may be given; epinephrine should be readily available to counteract anaphylactic reactions, and the person should be carefully observed immediately after immunization.

Serious systemic, anaphylactic, or neuroparalytic reactions occurring during the administration of rabies vaccines pose a serious dilemma for the attending physician. A patient's risk of developing rabies must be carefully considered before deciding to discontinue vaccination or to choose an alternate vaccine. Moreover, the use of corticosteroids to treat life-threatening neuroparalytic reactions carries the risk of inhibiting

Rabies Prevention — Continued

the development of active immunity to rabies. It is especially important in these cases that the serum of the patient be tested for rabies antibodies. Advice and assistance on the management of serious adverse reactions in persons receiving rabies vaccines may be sought from the state health department or CDC.

All serious systemic neuroparalytic or anaphylactic reactions to a rabies vaccine should be immediately reported to the state health department or the Viral Diseases Division, Bureau of Epidemiology, CDC (404/329-3727 during working hours, or 404/329-3644 at other times).

PRECAUTIONS AND CONTRAINDICATIONS

Use of Steroids and Immunosuppressive Agents

Corticosteroids and immunosuppressive agents can interfere with the development of active immunity and predispose the patient to developing rabies. They should not be administered during postexposure therapy unless essential for the treatment of other conditions. When rabies postexposure prophylaxis is administered to persons receiving steroids or immunosuppressive therapy, it is especially important that serum be tested for rabies antibody to ensure that an adequate response has developed.

Pregnancy

Because of the potential consequences of inadequately treated rabies exposure and limited data that indicate that fetal abnormalities have not been associated with rabies vaccination, pregnancy is *not* considered a contraindication to postexposure prophylaxis. If there is substantial risk of exposure to rabies, pre-exposure prophylaxis may also be indicated during pregnancy.

Allergies

Persons who have a history of hypersensitivity should be given rabies vaccines with caution. For example, with a history suggesting possible hypersensitivity to 1 vaccine, a patient should be given an alternate vaccine whenever available. When a patient with a history suggesting hypersensitivity to a vaccine must be given that vaccine (for example, when an egg-sensitive person must receive DEV because HDCV is not available), antihistamines can be given; epinephrine should be readily available to counteract anaphylactic reactions, and the person should be carefully observed.

For most allergic persons HDCV is less likely than DEV to cause an adverse reaction because it contains fewer extraneous proteins.

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TABLE 1. Rabies postexposure prophylaxis guide, March 1980

The following recommendations are only a guide. In applying them, take into account the animal species involved, the circumstances of the bite or other exposure, the vaccination status of the animal, and presence of rabies in the region. **Local or state public health officials should be consulted if questions arise about the need for rabies prophylaxis.**

	Animal species	Condition of animal at time of attack	Treatment of exposed person*
DOMESTIC	dog and cat	healthy and available for 10 days of observation	none, unless animal develops rabies †
		rabid or suspected rabid	RIG ‡ and HDCV §
		unknown (escaped)	consult public health officials. If treatment is indicated, give RIG ‡ and HDCV §
WILD	skunk, bat, fox, coyote, raccoon, bobcat, and other carnivores	regard as rabid unless proven negative by laboratory tests ¶	RIG ‡ and HDCV §
OTHER	livestock, rodents, and lagomorphs (rabbits and hares)	Consider individually. Local and state public health officials should be consulted on questions about the need for rabies prophylaxis. Bites of squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, other rodents, rabbits, and hares almost never call for antirabies prophylaxis.	

* **All bites and wounds should immediately be thoroughly cleansed with soap and water.** If antirabies treatment is indicated, both rabies immune globulin (RIG) and human diploid cell rabies vaccine (HDCV) should be given as soon as possible, **regardless** of the interval from exposure.

† During the usual holding period of 10 days, begin treatment with RIG and vaccine (preferably with HDCV) at first sign of rabies in a dog or cat that has bitten someone. The symptomatic animal should be killed immediately and tested.

‡ If RIG is not available, use antirabies serum, equine (ARS). Do not use more than the recommended dosage.

§ If HDCV is not available, use duck embryo vaccine (DEV). Local reactions to vaccines are common and do not contraindicate continuing treatment. Discontinue vaccine if fluorescent-antibody (FA) tests of the animal are negative.

¶ The animal should be killed and tested as soon as possible. Holding for observation is not recommended.

Rabies Prevention — Continued

TABLE 2. Rabies immunization regimens, March 1980

PRE-EXPOSURE: Pre-exposure rabies prophylaxis for persons with special risks of exposure to rabies, such as animal-care and control personnel and selected laboratory workers, consists of immunization with either human diploid cell rabies vaccine (HDCV) or duck embryo vaccine (DEV), according to the following schedule.

Rabies vaccine	No. of 1-ml doses	Route of administration	Intervals between doses	If no antibody response to primary series, give: *
HDCV	3	intramuscular	1 week between 1st and 2nd; 2-3 weeks between 2nd and 3rd †	1 booster dose †
DEV	3 or 4	subcutaneous	1 month between 1st and 2nd; 6-7 months between 2nd and 3rd † **or** 1 week between 1st, 2nd, and 3rd; 3 months between 3rd and 4th †	2 booster doses,† 1 week apart

POSTEXPOSURE: Postexposure rabies prophylaxis for persons exposed to rabies consists of the immediate, thorough cleansing of all wounds with soap and water, administration of rabies immune globulin (RIG) or, if RIG is not available, antirabies serum, equine (ARS), and the initiation of either HDCV or DEV, according to the following schedule.‡

Rabies vaccine	No. of 1-ml doses	Route of administration	Intervals between doses	If no antibody response to primary series, give:*
HDCV	5§	intramuscular	Doses to be given on days 0, 3, 7, 14, and 28 †	an additional booster dose †
DEV	23	Subcutaneous	21 daily doses followed by a booster on day 31 and another on day 41 † **or** 2 daily doses in the first 7 days, followed by 7 daily doses. Then 1 booster on day 24, and another on day 34 †	3 doses of HDCV at weekly intervals †

* If no antibody response is documented after the recommended additional booster dose(s), consult the state health department or CDC.

† Serum for rabies antibody testing should be collected 2-3 weeks after the last dose.

‡ The postexposure regimen is greatly modified for someone with previously demonstrated rabies antibody. (See text for details.)

§ The World Health Organization recommends a 6th dose 90 days after the 1st dose.

Replaces previous recommendations on rabies, the most recent of which was published in MMWR 1976;25:403-6.

Reprints of this article will be available upon request in approximately 8 weeks from Public Inquiries, Room 1/B63, Center for Disease Control, Atlanta, Georgia 30333.

International Notes

Yellow Fever — the Americas

In the period 1965-1979, the average annual number of cases of jungle yellow fever in the Americas, as reported to the Pan American Sanitary Bureau, was 114. Between 1967 and 1971, the number of reported cases was less than this average (Table 3).

Since 1972, the incidence of the disease has shown an upward trend, occurring in 2- or 3-year cycles and gradually affecting areas in which no cases had previously been reported. The annual transmission cycle (according to data for 1975-1978) usually began in December-January, reached its peak in April-July, and declined to its lowest level in September-November.

In 1979, 7 countries—Bolivia, Brazil, Colombia, Ecuador, Peru, Trinidad, and Venezuela—reported cases of jungle yellow fever. This is the highest number of reporting countries in 15 years (Table 3). As of December 31, 1979, a total of 205 provisional cases had been registered.

Eighteen cases of jungle yellow fever were reported from Trinidad. The first 8 occurred between December 27, 1978 and March 6, 1979. Two of the 8 patients died, the first from yellow fever and the second from a bacterial infection accompanied by meningitis and liver abscesses. The last patient had reportedly not been in jungle areas. Between August and December 1979, 10 more cases of jungle yellow fever were reported. Following confirmation of the initial cases, about 85% of the population was vaccinated against the disease.

In the Tarra region of Colombia, an epidemic began in mid-1978 in rural areas adjacent to forests; 28 deaths due to jungle yellow fever were reported. Thirteen of these were confirmed. Some of the patients, transferred for treatment to nearby urban communities that were infested by *Aedes aegypti*, subsequently died; however, no cases of the disease transmitted by that species of mosquito were confirmed. In 1979, Colombia reported 51 cases of jungle yellow fever in the Departments of Cesar (13), Magdalena (30), Meta (6), and Santander (2).

No data are available on the number of inhabitants exposed to jungle yellow fever or on the number of those vaccinated against the disease in the various countries. Vaccine

TABLE 3. Reported cases of jungle yellow fever, January 1, 1965-December 31, 1979,* by country

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Argentina	2	51	1	—	—	—	—	—	—	—	—	—	—	—	—
Bolivia	19	69	—	27	8	2	8	9	86	12	151	19	2	11	10
Brazil	14	167	2	2	4	2	11	12	70	13	1	1	9	27	12
Colombia	2	3	5	11	7	7	9	3	16	36	12	22	9	105	51
Ecuador	—	—	1	—	—	—	—	—	—	—	3	1	—	1	14
Guyana	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Panama	—	—	—	—	—	—	—	—	—	4	—	—	—	—	—
Paraguay	—	—	—	—	—	—	—	—	—	9	—	—	—	—	—
Peru	45	9	3	5	28	75	—	7	33	2	1	1	82	93	97
Suriname	—	—	—	1	1	—	—	2	—	—	—	—	—	—	—
Trinidad	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18
Venezuela	5	5	—	—	—	—	—	22	7	—	—	—	—	3	3
Total	87	304	12	47	48	86	28	55	212	76	168	44	102	240	205

*Provisional figures.
— = None.

Yellow Fever — Continued

coverage in the urban areas of Trinidad and Tobago, Venezuela, and some Colombian cities is believed to have been substantial, however.

A. aegypti infestation continues to be widespread in the Americas and affects many urban communities in the Hemisphere, especially in Colombia, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, the United States, and Venezuela, as well as numerous Caribbean islands.

In view of this situation, the Pan American Health Organization (PAHO) held a meeting of experts on yellow fever in Washington, D.C., in July 1979. The group concluded that, although the annual vaccine production in Latin America was 8 million doses, the current stock was low and insufficient to meet demand in the event of an urban epidemic. The group recommended that 5-10 million doses should be available at all times. Further recommendations included reviewing the current surveillance systems and vaccinating only those persons at risk.

Reported by the Virology Program, Communicable Disease Control Unit, Div of Disease Prevention and Control, PAHO, in the Epidemiological Bulletin 1980;1:2-4.

Current Trends

Availability of Laboratory Self-Instructional Material

Recognizing the need that clinical laboratorians, particularly those in rural hospitals, have for continuing education, the Bureau of Laboratories at CDC has developed a sound-slide series, titled "Laboratory Update," on aspects of bacteriology, parasitology, mycology, virology, immunology, venereal disease, clinical chemistry, hematology, and laboratory safety. Each 30-minute program consists of approximately 20 slides, a 10-page handout, and a cassette tape that can be used on any cassette player.

Sixty-four Laboratory Update lectures have been developed thus far (Table 4), and 25 new programs are being developed each year. Copies of each program have been sent to Training Coordinators in every state laboratory. The state laboratories, in turn, have established loan services to distribute these programs to laboratorians within the respective states. After listening to a program, laboratorians are encouraged to keep the handout for their own reference; the slides and tape must be returned to the state laboratories. The programs are also available for purchase from a non-profit educational organization.

The topics for the series are developed from suggestions submitted by clinical laboratory workers throughout the country. Programs are offered at the basic, intermediate, and advanced levels, with the primary goal of improving laboratory performance.

Reported by the Laboratory Training and Consultation Div, Bur of Laboratories, CDC.

TABLE 4. Laboratory Update current titles, May 1980.

CDC-76-1	Immunodiagnostic Tests for Autoimmune Diseases.
CDC-76-2	Anaerobic Bacteriology in the Clinical Laboratory.
CDC-76-3	The Quality Control of Laboratory Plating Media for Gonococcus and Other Bacterial Agents.
CDC-76-4	Radioimmunoassay. Part I.
CDC-76-5	Radioimmunoassay. Part II.
CDC-76-6	Radioimmunoassay. Part III.
CDC-76-7	Identification of Intestinal Protozoa. Part I.
CDC-76-8	Identification of Intestinal Protozoa. Part II.
CDC-76-9	The Role of the Clinical Microbiology Lab in Surveillance and Control of Nosocomial Infections.
CDC-77-10	Leukocyte Morphology in Healthy and Diseased States. Part I.
CDC-77-11	Leukocyte Morphology in Healthy and Diseased States. Part II.
CDC-77-12	Leukocyte Morphology in Healthy and Diseased States. Part III.

Self-Instructional Materials — Continued

TABLE 4. Laboratory Update current titles, May 1980 — *(Continued)*

CDC-77-13	Isolation and Identification of Streptococci. Part I.
CDC-77-14	Isolation and Identification of Streptococci. Part II.
CDC-77-15	Isolation and Identification of Streptococci. Part III.
CDC-77-16	CDC Approach to the ID of Non-Fermentative Gram-Negative Bacteria.
CDC-77-17	Identification of *Neisseria gonorrhoeae.* Part I.
CDC-77-18	Identification of *Neisseria gonorrhoeae.* Part II.
CDC-77-19	Biotyping of *Enterobacteriaceae* in the Clinical Laboratory.
CDC-77-20	Optimizing Spectrophotometric Measurement.
CDC-75-21	Statistical Aspects of Quality Control in Clinical Chemistry.
CDC-80-22	Disc Agar Diffusion Susceptibility Test.
CDC-75-23	Microscopic Evaluation of Red Blood Cell Morphology.
CDC-76-24	Safety Management in the Laboratory.
CDC-77-25	Current Aspects of Type B Hepatitis.
CDC-78-30	Fundamental Nature of the Antigen-Antibody System.
CDC-78-31	The Staphylococci.
CDC-78-32	Identification of Helminth Eggs and Larvae.
CDC-78-33	Collection of Satisfactory Fecal Specimens.
CDC-78-34	Evaluation of Techniques for Examining Fecal Specimens.
CDC-78-35	Preparing and Staining Fecal Smears and How to Correct Problems and Errors.
CDC-78-36	Preparing and Staining Blood Films for Diagnosis of Parasitic Infection.
CDC-78-37	Controlling Infectious Aerosols in the Laboratory.
CDC-78-38	Selection and Use of Kits in the Clinical Laboratory.
CDC-78-39	Rubella Screening and Control.
CDC-78-40	Serodiagnosis of Streptococcal Infection (ASO-ADB Tests).
CDC-78-41	Use of the Anaerobic Glove Box.
CDC-80-42	Detection of β-Lactamase in *Neisseria gonorrhoeae* and *Haemophilus influenzae.*
CDC-78-43	Serodiagnosis of Toxoplasmosis.
CDC-78-44	Evaluation of RIA Kits.
CDC-78-45	Human T and B Cells, Basic Concepts.
CDC-78-46	Presumptive ID of Anaerobic Nonsporeforming Gram-Negative Bacteria.
CDC-78-48	Demonstration of Legionnaires' Disease Agent in Tissue.
CDC-79-54	Quantifying O_2 and CO_2 in Blood.
CDC-79-55	Latex Agglutination Test for *Cryptococcus neoformans* Antigen.
CDC-79-56	Differentiation and Characterization of the Clinically Important Aerobic Actinomycetes.
CDC-79-57	Mycology: Preparation and Reading of Direct Smears.
CDC-79-58	Clinical Chemistry Methods. Part I. Selection and Evaluation.
CDC-79-59	Clinical Chemistry Methods. Part II. Implementation and Quality Control.
CDC-79-60	Identification of *Bordetella pertussis.*
CDC-79-62	Platelet Function and the Clinical Laboratory.
CDC-79-63	Handling and Storing Chemicals Safely.
CDC-79-64	Collection and Preparation of Specimens for Fungal Isolation.
CDC-79-65	Isolation Media Used in Recovering Systemic Mycotic Agents from Clinical Specimens.
CDC-79-66	Amebiasis.
CDC-79-69	Rapid Laboratory Diagnosis of Viral Diseases by Immunofluorescence.
CDC-79-70	Basic Clinical Microbiology. Part I. Host-Parasite Relationships.
CDC-79-71	Basic Clinical Microbiology. Part II. Sterilization and Disinfection.
CDC-79-72	Principles of Enzyme Immunoassay.
CDC-80-76	The Human Complement System. Part I.
CDC-80-81	Isolation and Identification of Streptococci. Part IV.
CDC-80-94	Basic Clinical Microbiology. Part III. Specimen Collection and Handling. a. An Overview
CDC-80-95	Basic Clinical Microbiology. Part III. Specimen Collection and Handling. b. Selection, Collection, and Transport of Bacteriological Specimens.
CDC-80-96	Basic Clinical Microbiology. Part III. Specimen Collection and Handling. c. Processing Clinical Specimens in the Bacteriology Laboratory.

Epidemiologic Notes and Reports

Follow-up on Mount St. Helens

Several federal agencies, including CDC, are continuing to investigate the effects on 9 northwestern and western states of the 2 recent eruptions at Mount St. Helens. Drinking water, air, and soil samples are being analyzed to see if the elements contained in the volcanic ash could cause health problems.

Region X of the Environmental Protection Agency (EPA) has been monitoring drinking water. No reports have been received of metals or toxins being introduced into drinking water systems. The only problem reported in association with the quality of the water is high turbidity in surface-water sources. Some small systems using unfiltered

Mount St. Helens — Continued

surface water are temporarily using wells. The unavailability of normal surface-water sources caused by the elevated turbidity, together with the elevated demand for water for cleanup and dust control, has caused water shortages in many areas.

Air-monitoring stations set up by Region VIII, EPA, in Montana, North Dakota, South Dakota, Colorado, Wyoming, and Utah indicate that—within this monitoring system—sections of Montana and North Dakota received the greatest fallout from the volcanic eruptions, as measured by total suspended particulates (TSP) in the air. Measurements of TSP in these 2 states on May 19-21 indicated peak 24-hour-average levels in excess of the EPA's "significant harm" level for TSP (1,000 $\mu g/m^3$, 24-hour average) (Table 5). The other 4 states are not known to have exceeded this standard. Measurements in the monitored states indicate that TSP levels have been decreasing since May 24, except in several stations in Oregon and Washington that were affected by the second eruption. On May 28, none of the EPA monitoring stations in Regions VIII and X reported TSP measurements exceeding 270 $\mu g/m^3$, 24-hour average.

The National Institute for Occupational Safety and Health (NIOSH) is also conducting air-sampling activities. Beginning June 2, area and personal air samples (from special filters worn by workers) were collected for 5- to 8-day periods in Moses Lake, Longview, Yakima, Centralia, Chehalis, and Spokane (Washington), Coeur d'Alene (Idaho), and areas of northern Oregon. Private homes, schools, and other public areas were included in the area sampling.

The Food and Drug Administration (FDA) is analyzing samples of ash, soil, and milk from dairy herds in heavily affected areas of Washington, Idaho, and Montana to determine if elements from the ash are being introduced into the food chain. The Bureau of Foods, FDA, will conduct animal-feeding studies, if they are indicated by the findings.

Reported by Regions VIII and X, EPA; FDA; NIOSH, Chronic Diseases Div, Bur of Epidemiology, CDC.

TABLE 5. Peak levels (24-hour averages) of total suspended particulates (TSP) in the air in selected cities, Montana and North Dakota

Station		TSP/$\mu g/m^3$ (24-hour average)	Date in May
Montana:	Billings	1020	19
	Helena	3406	19
	Butte	2063	19
	Missoula	8959	19
	Great Falls	5689	19
	Kalispell	5287	20
	Libby	1311	21
North Dakota:	Williston	1217	21
	Dickinson	1095	21
	Minot	1401	21

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