VIRGINIA
EPIDEMIOLOGY BULLETIN

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April, 1988 Volume 88, Number 4

Hepatitis A Outbreak, Virginia Beach

Outbreak Report

In February 1988, several cases of hepatitis A were reported in patrons of a Mexican-style fast-food restaurant in Virginia Beach. Clustering of onset dates suggested a common-source exposure. Investigation revealed an index case in a foodhandler who had worked at this restaurant from January 5 through February 1, 1988. This individual had onset of jaundice on January 18, but was not diagnosed as having hepatitis A until February 1 when IgM antibody to hepatitis A virus (IgM anti-HAV) was detected in a serum sample. On that day, he was relieved of all foodhandling responsibilities. Other foodhandlers in the restaurant were reminded of the need for good handwashing practices, were administered immune globulin (IG), and were advised to wear plastic gloves. By mid-March over 40 cases of hepatitis A had been reported in the restaurant's patrons. Several of those cases were in foodhandlers at other restaurants, where similar control measures were taken, with the addition of IG administration to patrons, where appropriate.

Diagnosis of Hepatitis A

Illness typically begins abruptly with fever, anorexia, nausea, and abdominal discomfort, followed several days later by jaundice. Severity increases with age, although fatalities are rare. Many infections in children are asymptomatic. Diagnosis is usually established by detecting IgM antibodies against the virus in the serum of ill or recently ill patients. IgM antibodies are usually only demonstrable for up to six months after infection. IgG antibody to the virus persists for up to a lifetime after infection; a positive anti-HAV test (without IgM specificity) is only indicative of infection at some time in the past and therefore does not provide good supportive evidence of recent infection.

Epidemiology

Hepatitis A is transmitted primarily through person-to-person contact by the fecal-oral route. Viral particles are found in the feces a week or two before onset of symptoms, with the number diminishing rapidly after the onset of symptoms or laboratory evidence of liver dysfunction. Transmission is facilitated by poor personal hygiene. Daycare facilities with children in diapers have been shown to be important settings for HAV transmission. Only a fraction of reported cases are the result of common-source outbreaks due to contaminated food or water.

Most foodhandlers diagnosed as having hepatitis A do not cause foodborne outbreaks of hepatitis A. Each year approximately 1000 cases of hepatitis A infection in foodhandlers are reported in the U.S., while an average of only four foodborne outbreaks of hepatitis A are reported each year. Transmission in this setting is thought to be a function of the foodhandler's hygiene practices, the amount of virus excreted, and whether or not the food is cooked after handling.

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Prevention

The mainstay of prevention is education of the public and foodhandlers concerning the importance of personal hygiene and good sanitation. Postexposure prophylaxis with IG (0.02 ml/kg IM) is recommended for all close personal contacts (e.g. household and sexual contacts) of persons with hepatitis A. Serologic screening of contacts for anti-HAV before giving IG is not recommended. Because the prophylactic value of IG is only high when given early in the incubation period, administration to a contact more than two weeks after exposure is not indicated.

When a foodhandler is diagnosed as having hepatitis A, IG should be given to other foodhandlers in the same establishment. It is usually not recommended for patrons, with the possible exception of the situation where: (a) the infected foodhandler was directly involved in handling, without gloves, foods that were not cooked prior to being served, (b) the personal hygiene of the foodhandler is judged to have been deficient based on interviews and observation, and (c) patrons can be identified and given IG within two weeks of exposure. IG is not recommended for patrons after cases have begun to occur in that group, since the 2-week period during which IG would have been effective will have already passed.

More detailed recommendations, including preexposure prophylaxis for international travelers, have been previously published (Centers of Disease Control. Recommendations for protection against viral hepatitis. MMWR 1985; 34:313–324, 329–335 or Virginia Epidemiology Bulletin 1985; 85[8]).

Update: Serologic Testing for Antibody to Human Immunodeficiency Virus

Tests to detect antibody to human immunodeficiency virus (HIV), the virus that causes acquired immunodeficiency syndrome (AIDS), were first licensed by the Food and Drug Administration (FDA) in 1985, primarily as screening tests for blood and plasma donation. Since that time, millions of HIV antibody tests have been performed in laboratories of blood and plasma collection centers, in counseling and testing centers, and in clinical facilities as well as for purposes such as screening active duty military personnel and applicants for military service. Assuring accurate test results requires continued attention to both the intrinsic quality of the tests and the performance of the technical personnel doing the tests.

Given the medical and social significance of a positive test for HIV antibody, test results must be accurate, and interpretations of the results must be correct. For these reasons, the Public Health Service has emphasized that an individual be considered to have serologic evidence of HIV infection only after an enzyme immunoassay (EIA) screening test is repeatedly reactive* and another test such as Western blot (WB) or immunofluorescence assay has been performed to validate the results *(1)*.†

Licensed test kits currently available in the United States for HIV antibody testing comprise seven EIAs and one WB. All of these tests use HIV antigens derived from disruption of whole virus cultured in human-derived cell lines. In addition, many laboratories produce their own WB test reagents using viral antigen purchased from commercial sources. A variety of other test procedures are in use or under development or are being evaluated for licensure.

Criteria for interpretation of a reactive anti-HIV EIA test are based on data from clinical studies performed under the auspices of each manufacturer. Since licensure of the first EIA test kits in 1985, the manufacturers have worked to improve the sensitivity, specificity, and reproducibility of their assays.§ Clinical data submitted by the manufacturers to FDA for licensure indicate that the sensitivity and specificity of the EIA tests currently marketed in the United States are >99.0%. Other laboratories performing comparative analyses of licensed anti-HIV EIA test kits have found similar or slightly lower sensitivity and specificity *(2-5)*. In routine use, both the sensitivity and specificity of the tests depend on the quality of testing in the laboratory. In addition, false-positive test results are observed when nonspecific serologic reactions occur among uninfected persons who have immunologic disturbances or who have had multiple transfusions. False-negative test results are observed among persons who have recently become infected with HIV and who have not yet developed detectable antibody *(6)*.

Repeating each initially reactive EIA test increases the specificity of the test sequence by reducing the

**The terms "reactive" or "nonreactive" are used to describe serum or plasma specimens that give reactive or nonreactive test results and to describe the test results from EIA or WB tests before final interpretation. The terms "positive" and "negative" are used to describe the interpretation of EIA test results indicating that the specimen tested is 1) repeatedly reactive (positive) or 2) nonreactive or not repeatedly reactive (negative). The terms "positive," "indeterminate," and "negative" are used to describe the interpretation of WB test results that indicate that the specimen tested is reactive with a specific pattern of bands (positive), reactive with a nonspecific pattern of bands (indeterminate), or nonreactive (negative).*

†Blood and plasma are not accepted for transfusion or further manufacture when the EIA screening test is positive, regardless of the results of other tests that may be performed.

§Sensitivity is the probability that the test result will be reactive if the specimen is a true positive; specificity is the probability that the test result will be nonreactive if the specimen is a true negative; and reproducibility (reliability) is the ability to replicate qualitative results with the same or similar test procedures on blindly paired samples.

¶The predictive value of a positive or negative test is the probability that the test result is correct.

possibility that technical laboratory error caused the reactive result. In the American Red Cross Blood Services laboratories, a specificity of approximately 99.8% has been consistently achieved during screening of donated blood (7, unpublished data). However, in a population with a low prevalence of infection, even a specificity of 99.8% does not provide the desired predictive value[¶] for a positive test. For this reason, it is particularly important not to rely solely on EIA testing to determine whether a person is infected with HIV. Rather, EIA test results should be validated with an independent supplemental test of high specificity conducted by a laboratory with high performance standards. In the United States, the validation test used most often is the WB. Some laboratories also use radioimmunoprecipitation assays and indirect immunofluorescence assays.

For the licensed WB test, interpretation of reactive and nonreactive tests is based on data from clinical studies submitted to FDA for licensure. The manufacturer states that, for a test to be considered positive with this WB, antibody must be reactive with multiple virus-specific protein bands, i.e., p24, p31, and either gp41 or gp160 (Table 1). If fewer bands are present, the test is considered indeterminate; it is interpreted as negative only if no bands are present on the blot. When the manufacturer's stringent criteria are used for interpreting test results, the probability of either a false-positive or a false-negative result is extremely small. In clinical trials for licensure of this WB, however, as many as 15% to 20% of tests on persons at low risk for HIV infection were described as indeterminate. Sera from persons recently infected with HIV also may produce an indeterminate WB pattern. For such persons, a repeat WB on a second specimen obtained after the initial specimen often yields a positive blot pattern within 6 months. Conversely, follow-up testing of uninfected persons whose serum had an indeterminate blot pattern on initial testing usually will show no change in the banding pattern. Serum from some HIV-infected persons who have advanced immunodeficiency may have an indeterminate pattern because of a loss of antibodies to *non-env* proteins *(8)*. To reinstate donors with a history of a positive EIA test, blood and plasma centers may use only results from the licensed WB test performed in the FDA-approved test sequence.

The performance characteristics of the unlicensed tests used by many laboratories, whether WB, immunofluorescence assays, or other procedures, have not been uniformly subjected to the same rigorous scrutiny required for licensure by FDA. Recommendations for standardization have been published *(9)*, but the extent to which these are followed is unknown. Information about production standards, inter-lot variability, or validation of criteria used for interpretation often is not available. Absence of standardization and appropriate quality controls may result in a lower sensitivity or specificity and, thus, a higher probability of inaccurate results *(10)*.

Despite the existence of a licensed WB test, many laboratories continue to use unlicensed WB tests because of cost and the stringent criteria required for interpreting the licensed test. The potential problems in using and interpreting unlicensed WB tests have been openly debated *(11,12)*. Although unlicensed WB tests can be highly accurate and reproducible when done with appropriate quality controls in laboratories with established performance standards *(9)*, not all laboratories meet acceptable performance standards. Ten of 19 laboratories bidding for contracts to perform WB tests for the Department of Defense failed the required proficiency panel on one or more occasions *(13)*. Two of the laboratories satisfying the performance standards were awarded contracts by the U.S. Army. Both of these laboratories use well-validated techniques for WB that yield virus-specific bands at p17, p24, p31, gp41, p53, p55, and p64. The U.S. Army considers these WBs to be positive if bands are present either at gp41 or at both p24 and p55 *(14)*. In comparison with multiple validation procedures, WBs in these contract laboratories have an estimated specificity of 99.4%, and the laboratories have consistently performed accurately on all pre- and post-award quality assurance serum panels *(14)*. These and other laboratories have demonstrated that the achievable false-positive rate of sequentially performed EIA and WB tests can be <0.001% (<1/100,000 persons tested) *(13,15)*.

The College of American Pathologists (CAP), in conjunction with the American Association of Blood Banks, conducts an open proficiency testing program** for laboratories performing HIV antibody tests. Each quarter, more than 600 laboratories that participate voluntarily report results from testing five coded samples of plasma that have various known levels of anti-HIV reactivity or that are nonreactive.

In the CAP survey conducted in October 1987, the results of EIA tests at the participating laboratories correlated well with results from the

Table 1. Description of major gene products of human immunodeficiency virus (HIV)

Gene Product*	Description
p17	*gag*[†] protein
p24	*gag* protein
p31	Endonuclease component of *pol*[§] translate
gp41	Transmembrane *env*[¶] glycoprotein
p51	Reverse transcriptase component of *pol* translate
p55	Precursor of *gag* proteins
p66	Reverse transcriptase component of *pol* translate
gp120	Outer *env* glycoprotein
gp160	Precursor of *env* glycoprotein

*Number refers to molecular weight of the protein in kilodaltons; measurement of molecular weight may vary slightly in different laboratories.
[†]*gag* = core.
[§]*pol* = polymerase.
[¶]*env* = envelope.

**"*The laboratories know that the samples have been supplied for proficiency testing.*

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referee laboratories (Table 2). For the three reactive samples (W-21, W-23, W-24), correlation ranged from 99.5% to 100%. For the single nonreactive sample that could be adequately evaluated (W-25), correlation was 98.3%. The nonreactive W-22 sample that was sent with the October 1987 serum panel had been prepared with a pool of processed plasma that caused an unexplained, nonspecific reaction with one of the EIA test kits. Consequently, the EIA results for this sample could not be evaluated.

Table 2. Comparison of responses by referee and participant laboratories on samples tested for anti-HIV by enzyme immunoassay (EIA), by sample number—College of American Pathologists Proficiency Testing, 1987

Sample Number	Reactivity	Percentage of Laboratories Reporting Correct Result	
		Referee Laboratory*	Participant Laboratory†
W-21	Reactive	100.0	99.8
W-22§	Nonreactive	80.0	51.4
W-23¶	Reactive	100.0	99.5
W-24¶	Reactive	100.0	100.0
W-25	Nonreactive	100.0	98.3

*Results reported by 15 laboratories selected because of extensive experience and excellent long-term performance in proficiency testing programs.
†Results reported by 601 other laboratories that voluntarily participated.
§Sample W-22 was prepared with a pool of processed plasma that caused an artifactual, nonspecific reaction with one EIA test kit.
¶Samples W-23 and W-24 were identical.

The individual participating laboratories used their own criteria for interpreting WB results. WB results for two of the three reactive specimens were reported as indeterminate by one referee laboratory each, while results for the two nonreactive specimens in the CAP survey were reported correctly by all 10 referee laboratories (Table 3). One of the 73 participating laboratories reported a nonreactive sample (W-22, the sample that gave artifactual reactions with one of the EIA test kits) as reactive, while approximately 5% reported the two nonreactive samples as indeterminate, and 12% to 15% reported two of three reactive specimens as indeterminate.

For the three reactive samples, the results of 241 repeatedly reactive EIA tests could be compared with WB results (Table 4). For 215 (89.2%) of these, the WB tests were reported as positive; for 23 (9.5%), the WBs were reported as indeterminate; and, for 3 (1.2%), they were reported as negative. Of 58 WB results performed on nonreactive samples found nonreactive by EIA, 55 (94.8%) were reported as negative by WB, and 3 (5.2%) were reported as indeterminate. None of the nonreactive samples were read as positive by WB.

Because criteria used to interpret WB varied by laboratory, banding patterns reported in the 299 WB tests conducted in the October 1987 survey were examined (Table 5). Two or more virus-specific protein bands were reported in 215 blots, 208 (96.7%) of which were interpreted as positive. Eighteen (60.0%) of 30 blots with only a single virus-specific protein band were considered positive. When the single protein band was from the *env* gene, 12 (85.7%) of 14 were read as positive. These data demonstrate that different laboratories may report different WB results for samples with the same banding patterns.

Results of CAP proficiency tests from more than 500 laboratories participating in the 1986 and 1987 surveys indicate the following performance for the anti-HIV EIA test. Of 6,946 tests on reactive samples, 99.5% were reported as positive. Of 1,142 tests on nonreactive samples, 98.3% were interpreted as negative. Based on results from 601 laboratories on a pair of identical reactive samples (W-23 and W-24), reproducibility was 99.5%.

For the WB test, calculations were based only on positive or negative results divided by the total number of tests in the October 1987 CAP survey (Table 4). For the reactive samples, 89.2% of 241 results were correctly interpreted as positive, and, for the nonreactive samples, 94.8% of 58 results were correctly interpreted as negative. Reproducibility, which was based on 83 tests on a pair of identical reactive samples (W-23 and W-24), was 95.2%. The performance of the referee laboratories was more accurate for the EIA and much more accurate for the WB than was the performance of the participating laboratories. The performance of the licensed and unlicensed WB tests could not be compared because the data were not collected.

Editorial Note: Quality laboratory testing for HIV antibody is a critically important element for surveillance and detection of HIV infection. The laboratory testing process requires quality assurance for each step including: 1) collection, labeling, and transport of specimens; 2) laboratory reagents and procedures: 3) interpretation of analytical results; and 4) communication from the laboratory scientist to the clinician and then to the person being tested. Quality performance is promoted by using licensed or standardized tests in proper sequence and by developing consensus about interpretation of analytical results.

Proficiency testing benefits participating laboratories by identifying problems with particular types of samples, with particular tests, or with interpretation of results. However, results of proficiency testing programs should be interpreted cautiously. Data from proficiency testing measure only the operational performance of participating laboratories but cannot be used to measure the sensitivity or specificity of a given test. Samples provided for testing in the HIV antibody surveys may be pooled human plasma samples with known levels of anti-HIV reactivity, or they may be dilutions of a single reactive plasma sample in HIV-negative serum. They are rarely fresh serum specimens from a person who is or is not infected with HIV. Some samples are selected because they exhibit nonspecific reactivity or are otherwise difficult to test and interpret; they are not typi-

Table 3. Comparison of responses on samples tested for anti-HIV by Western blot (WB) by referee and participant laboratories,* by sample number—College of American Pathologists Proficiency Testing, 1987

Sample Number	Reactivity	Interpretation of WB Test Results (Percentage of Responses)					
		Positive Test		Indeterminate Test		Negative Test	
		Referee Laboratory	Participant Laboratory	Referee Laboratory	Participant Laboratory	Referee Laboratory	Participant Laboratory
W-21	Reactive	100.0	100.0	0.0	0.0	0.0	0.0
W-22	Nonreactive	0.0	1.6	0.0	4.9	100.0	93.4
W-23	Reactive	90.0	80.8	10.0	15.1	0.0	4.1
W-24	Reactive	90.0	84.9	10.0	12.3	0.0	2.8
W-25	Nonreactive	0.0	0.0	0.0	5.6	100.0	94.4

*Results reported by the 10 referee and 73 participant laboratories that performed both EIA and WB tests.

Table 4. Relationship between results on samples tested for anti-HIV by enzyme immunoassay (EIA) and Western blot (WB), by sample number—College of American Pathologists Proficiency Testing, 1987

Sample Number	Reactivity	Results by EIA*		Results by WB*		
		Positive	Negative	Positive	Indeterminate	Negative
W-21	Reactive	76	0	76	0	0
W-23	Reactive	83	0	69	13	1
W-24	Reactive	82	0	70	10	2
W-25	Nonreactive	0	58	0	3†	55
Total		**241**	**58**	**215**	**26**	**58**

*Number of responses reported by both referee and participant laboratories. Sample W-22 was excluded because of an artifact of the sample.
†One Sample by WB had only p24 bands reported; one sample had both p24 and p32 bands reported; and one sample had no bands reported.

Table 5. Distribution and interpretation of HIV-specific protein band patterns on Western blot* (WB)—College of American Pathologists Proficiency Testing, 1987

HIV-Specific Bands†	WB as Interpreted by Referee and Participant Laboratories					
	Positive		Indeterminate		Negative	
	No.	(%)	No.	(%)	No.	(%)
None	0	(0.0)	9	(7.1)	118	(92.9)
Single Band	18	(60.0)	9	(30.0)	3	(10.0)
gag	6	(42.9)	7	(50.0)	1	(7.1)
pol	0	(0.0)	2	(100.0)	0	(0.0)
env	12	(85.7)	0	(0.0)	2	(14.3)
Multiple Bands	208	(96.7)	4	(1.9)	3	(1.4)
gag, pol	8	(80.0)	1	(10.0)	1	(10.0)
gag, env	125	(98.4)	0	(0.0)	2	(1.6)
pol, env	2	(40.0)	3	(60.0)	0	(0.0)
gag, pol, env	73	(100.0)	0	(0.0)	0	(0.0)
Total	**226**	**(60.8)**	**22**	**(5.9)**	**124**	**(33.3)**

*Samples tested and reported include reactive samples W-21, W-23, and W-24 and nonreactive samples W-22 and W-25.
†Bands may be any proteins or glycoproteins that are products of the genes listed. HIV-specific gene products are shown in Table 1.

cal of the vast majority of specimens that will be handled by the participating laboratories. For instance, in normal practice, samples W-22 and W-25 would not be tested by WB because the EIA was nonreactive. The nonspecific reactivity of the type that occurred with specimen W-22 cannot always be predicted; a similar unexplained nonspecific reaction occurred in a proficiency testing program conducted by CDC *(16)* and with several samples used by the American Association of Bioanalysts (unpublished data).

The number of specimens commonly used in proficiency testing programs (five in each CAP survey) sent to each laboratory also limits the application of survey results. This number of specimens is not sufficient to measure adequately the performance of any single laboratory. The number of specimens tested per month in different laboratories varies enormously, and no attempt is made in the survey to select a representative sample of laboratories performing the test; those that choose to participate in the survey do so voluntarily.

Laboratories in the surveys reported indeterminate WB results on some reactive and nonreactive samples. An indeterminate result is not a final result; it requires additional laboratory testing on the same specimen and often entails asking the person from whom the specimen was obtained to provide one or more additional specimens. The final interpretation of an indeterminate result frequently will also require additional epidemiologic, clinical, or corroborating laboratory information.

Even among the diverse laboratories participating in the CAP survey, none performing the EIA and WB tests in sequence would have reported false-positive test results. However, performance and interpretation of WB tests vary among laboratories. The Public Health Service is convening a meeting to address these issues. A nationwide performance evaluation program for HIV antibody testing has been started by CDC's Training and Laboratory Program Office and Center for Infectious Diseases *(17)*. The first sample shipment, consisting of reference materials was mailed in November 1987 to more than 700 participating U.S. laboratories.

The predictive values of both positive and negative test results for HIV antibody are extremely high in laboratories that have good quality control and high performance standards and that use licensed EIA tests and the licensed WB or other well-standardized tests. Physicians or other health-care providers who re-

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quest HIV antibody tests and who counsel persons about test results must have a clear understanding of the significance of the test results and the potential pitfalls of the testing process. When test results are indeterminate or inconsistent with other information, additional information should be obtained to try to confirm whether the person is infected with HIV. The counseling procedure should include a careful assessment of the person's potential risks or exposures to HIV. As for all medical tests, results should be interpreted in concert with all the historic, epidemiologic, clinical, and other pertinent laboratory information available.

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National Mailing of AIDS Brochure

Between May 26 and June 15, 1988, the Centers for Disease Control will mail a brochure containing basic information about AIDS to 107 million households in the nation. The brochure will not contain information that has not already been disseminated to the public over the past few years. It is, nevertheless, likely to generate an increase in telephone calls and more requests for HIV antibody testing and counseling. We trust that this information will help you to be better prepared to respond to your patients' concerns generated by the brochure.

Administration of Human Diploid-Cell Rabies Vaccine in the Gluteal Area*

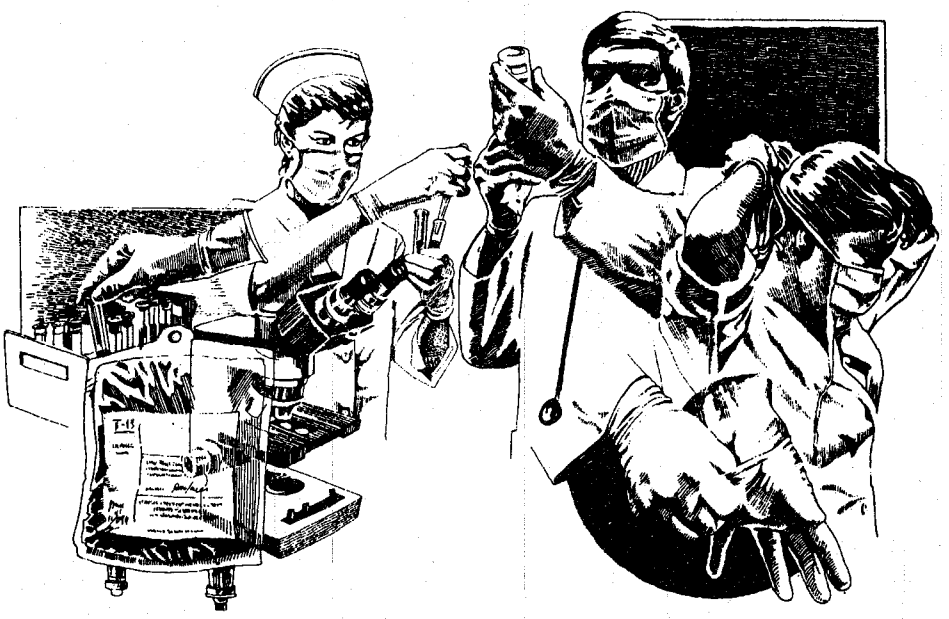
To the Editor: Shill et al. (May 14 issue)[1] reported a case of rabies in a 19-year-old South African man who was bitten on the finger by a rabid mongoose and promptly received both local wound treatment and the recommended doses of human rabies immune globulin and human diploid-cell rabies vaccine. Although the reason rabies developed in this patient is unknown, Shill et al. speculate that as is the case with hepatitis B vaccine,[2,3] administration of the rabies vaccine into fat tissue in the gluteal area may have led to the failure of the vaccine.[1]

To determine how frequently the rabies vaccine is administered in the gluteal area and how administration in the gluteal area affects antibody response, we conducted a survey of 39 adults who received postexposure rabies prophylaxis in Georgia and Illinois between April 1986 and April 1987. In six of the subjects (15 percent), all five doses of the vaccine were administered in the gluteal area, and in another four (10 percent), some but not all of the five doses were administered in that area.

Serum samples were obtained from 19 of the 39 persons one to five weeks after the fifth dose of the vaccine. The 4 who had received at least one dose in the buttock had lower rabies neutralizing-antibody titers (0.2, 5.1, 9.8, and 13.2 IU per milliliter) than did the 15 who received all five doses in the deltoid muscle (median, 19.5 IU per milliliter; range, 5.9 to 101.8) ($P = 0.01$ by Wilcoxon rank-sum test). All persons in this survey had titers in excess of the minimum established by the Immunization Practices Advisory Committee (complete neutralization at a 1:5 dilution[4] [about 0.2 IU per milliliter]), but one person had a titer of 0.2 IU per milliliter, which would have been considered inadequate according to the more conservative minimal titer established by the World Health Organization (0.5 IU per milliliter). Studies of rabies in animals have shown that in some vaccinated animals whose titers fall below 0.5 IU per milliliter, rabies may develop after a challenge with live rabies virus.[5]

The results of this survey indicate that administration of human diploid-cell rabies vaccine into the gluteal area appears to be a common practice. This may be partly attributable to the package insert, which states that the vaccine should be injected "intramuscularly, preferably into the deltoid muscle or into the upper and outer quadrant of the buttocks."

Vaccination in the gluteal area results in lower neutralizing-antibody titers than vaccination in the deltoid area, and it may damage the sciatic nerve. In adults, the vaccine should always be administered in the deltoid area; in children, the anterolateral aspect of the thigh is also acceptable.[6,7]



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Cases of selected notifiable diseases, Virginia, for the period March 1, through March 31, 1988.

Disease	State					Regions				
	This Month	Last Month	Total to Date 1987	Total to Date 1988	Mean 5 Year To Date	This Month N.W.	N.	S.W.	C.	E.
Measles	41	0	0	41	2	41	0	0	0	0
Mumps	3	1	3	7	7	1	0	1	1	0
Pertussis	5	1	29	7	13	3	0	0	0	2
Rubella	0	0	0	0	0	0	0	0	0	0
Meningitis—Aseptic	12	4	38	23	38	2	2	0	1	7
*Bacterial	12	21	42	39	74	0	2	4	1	5
Hepatitis A (Infectious)	74	0	76	84	47	4	5	0	5	60
B (SERUM)	26	16	100	57	128	1	2	6	4	13
NON-A, NON-B	17	3	10	22	21	2	6	0	4	5
Salmonellosis	78	94	219	244	229	12	18	13	21	14
Shigellosis	29	36	29	100	37	2	9	9	2	7
Campylobacter Infections	14	33	87	75	89	3	6	1	2	2
Tuberculosis	42	40	83	105	83	9	7	5	8	13
Syphilis (Primary & Secondary)	41	38	61	105	109	0	1	21	9	10
Gonorrhea	956	988	3998	3174	4520	—	—	—	—	—
Rocky Mountain Spotted Fever	0	0	0	0	0	0	0	0	0	0
Rabies in Animals	53	22	85	88	89	8	16	5	17	7
Meningococcal Infections	9	6	25	19	25	3	0	1	0	5
Influenza	506	1421	1172	2022	1428	45	3	362	65	31
Toxic Shock Syndrome	0	0	0	0	1	0	0	0	0	0
Reye Syndrome	0	0	0	0	1	0	0	0	0	0
Legionellosis	1	1	2	2	4	1	0	0	0	0
Kawasaki's Disease	2	1	5	3	8	0	0	0	1	1
Acquired Immunodeficiency Syndrome	32	48	55	98	—	2	12	1	7	10

Counties Reporting Animal Rabies: Amelia 3 raccoons; Arlington 1 fox, 2 raccoons; Bath 1 raccoon; Botetourt 1 skunk; Buckingham 1 skunk; Chesterfield 6 raccoons; Essex 1 raccoon; Fairfax 1 fox, 7 raccoons, 1 skunk; Fauquier 1 cat; Fluvanna 1 raccoon; Hanover 3 raccoons; Henrico 2 raccoons; Lancaster 1 raccoon; Loudoun 1 fox, 2 raccoons, 1 skunk; Middlesex 1 fox; New Kent 1 raccoon; Northumberland 1 fox, 1 raccoon; Page 2 skunks; Richmond City 1 raccoon; Richmond County 2 raccoons; Rockbridge 1 skunk; Rockingham 1 skunk; Shenandoah 1 skunk; Smyth 1 skunk; Washington 3 skunks.

Occupational Illnesses: Asbestosis 30; Carpal Tunnel Syndrome 1; Loss of Hearing 6; Pneumoconioses 59; Poisoning-Chemical 1; Poisoning-Metal 2.

*other than meningococcal

Published Monthly by the
VIRGINIA HEALTH DEPARTMENT
Office of Epidemiology
109 Governor Street
Richmond, Virginia 23219