
Pre-exposure Immunization Against Rabies: a Re-emphasis for Veterinarians

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A LESS HAZARDOUS RABIES VACCINE of avian origin, which became available in the mid-1950s, provided an opportunity to immunize persons likely to be exposed to this disease. Veterinarians, an acknowledged risk group, were encouraged by various schools of veterinary medicine and State veterinary associations to obtain pre-exposure prophylaxis (1). The guidelines on rabies prophylaxis issued by the Public Health Service Advisory Committee on Immunization Practices (ACIP) in 1967 recommended pre-exposure immunization for veterinarians and other high-risk groups (2). The more recent ACIP guidelines of June 1980 (3) include recommendations for a series of three injections followed by a serologic test to determine if an

adequate rabies antibody response has occurred. Additional boosters are suggested for those without detectable antibodies; biennial boosters are recommended for those with continuing exposure.

In Tennessee, veterinarians were given the opportunity to determine their extent of immunologic protection against rabies at the annual Tennessee Veterinary Medical Association convention in January 1977. A serologic testing service was provided by public health workers.

Methods

Throughout the sessions of the convention, it was announced that serologic testing for determining immune status against rabies was available onsite and without charge. Descriptive data were obtained from each participant by means of a brief questionnaire that included age, year of graduation from veterinary college, history of immunization in veterinary college, and the date when the most recent booster was received.

A blood specimen was drawn from each participant. After all the specimens were obtained, they were sent to the Viral Zoonoses Laboratory of the Center for Disease Control

(CDC) in Lawrenceville, Ga., where they were tested for rabies antibodies by the rapid fluorescent-focus inhibition test (4). CDC considers titers of 1:16 or greater to represent an adequate response to rabies vaccine; titers equal to 1:15, questionable; and titers less than 1:15, inadequate levels of antibodies.

Test results and the appropriate ACIP recommendations for establishing or maintaining an acceptable degree of protection were mailed to each participant. Participants with inadequate or questionable titers were advised to obtain a booster and to submit a serum specimen 10 to 20 days thereafter for an evaluation of antibody response. A biennial vaccination was recommended for the veterinarians who had serologic evidence of protection.

All of the participants were contacted by telephone 2½ years after the 1977 convention. They were asked if they had received a booster since then, and they were also questioned about any post-exposure immunization they had obtained during their careers.

Results

Of the 160 veterinarians who attended the convention, 26 (16 percent) volunteered to submit blood

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samples for rabies antibody testing. The ages of the participants ranged from 27 to 60; the mean age was 41. The time since graduation from veterinary college ranged from 1 to 27 years. Of the 26 participants, 18 (69 percent) had received a booster at some time after graduation. Of 23 who had graduated at least 2 years before the convention, 7 (30 percent) had been vaccinated within the 2 years before they volunteered to participate. Overall, the participants averaged 5.5 years since their last pre-exposure rabies immunization.

No evidence of a serologic response from a rabies vaccination was seen for 15 (more than half) of the veterinarians tested. Two had questionable titers of 1:15, and 9 had protective levels of $\geq 1:16$. Relatively high titers of $\geq 1:40$ were seen in 7 of the protected group; however, 6 of these veterinarians had had additional post-exposure prophylaxis at least once during their careers, and 1 had recently received the then experimental human diploid cell vaccine (HDCV). Thus, only 2 (16 percent) of 20 participants had protective antibody levels related solely to a pre-exposure immunization.

Two years after the test results

and recommendations were mailed to the participants, only one participant had obtained a booster. This veterinarian, who initially had an unacceptable titer, did not submit a post-immunization blood specimen for evaluation of antibody response.

Discussion

Although statistical inferences concerning attitudes of the veterinarian community toward pre-exposure immunization cannot be made from our volunteer sample, our results as well as anecdotal reports underscore the general apathy toward pre-exposure rabies immunization among veterinarians. Only 16 percent of a large delegation of veterinarians took advantage of a readily available, cost-free serologic testing service, and only 1 participant had attempted to maintain protection in the 2 subsequent years.

The apparent lack of concern among these veterinarians may have been generated by the decline in human cases and in the incidence of rabies in domestic animals. Perhaps for these reasons and the fact that no fatality from rabies has occurred among clinical veterinarians in the United States for more than 20 years, most veterinarians may per-

ceive the risk as insignificant. However, as recently demonstrated by the mass rabies exposure at a veterinary diagnostic laboratory in Colorado (5), a decline in incidence alone does not preclude the need for continuing prevention. In our study, six veterinarians had obtained post-exposure prophylaxis because of rabies-proved exposures during their clinical practice. Furthermore, the rabies virus remains endemic in wild animals in most areas of the United States.

Apathy toward immunization also may have been accentuated by a misconception that a single series provides lifelong protection, as well as by the bothersome procedures necessary to sustain and document immunologic protection. Although pre-exposure immunization and followup serologic testing may be readily available in veterinary colleges, this may not be the case in private practice. Among our group of participants, only 7 of the 23 in practice for more than 2 years had obtained a booster according to the recommendations. This lack of adherence to an immunization schedule and the low rate of immunologic protection observed in our participants and others stress the need for use of the more immunogenic

human diploid cell strain rabies vaccine for pre-exposure prophylaxis (6-11).

The following table shows the pre-exposure immunization regimen with HDCV currently recommended by the ACIP.

<i>Procedure</i>	<i>Interval</i>
1 ml intramuscular injections . . .	Day 0, 7, 21, or 28
Serum for rabies antibody testing ¹	² 2-3 weeks after last injection
Booster for maintaining protection	Every 2 years

¹ Testing may be arranged through the State health department.

² If antibody response is inadequate, give booster dose and repeat titer in 2 to 3 weeks. Contact the State health department or the Center for Disease Control, Atlanta, Ga., if antibody response remains inadequate.

Data collected in the United States indicate that 98.4 percent of the people who follow this regimen will develop antibodies, in contrast to 80-90 percent for those who receive duck embryo vaccine (3). The recent availability of licensed

HDCV in the United States provides an impetus for veterinarians to obtain immunologic protection against rabies. At the time we were preparing this manuscript, HDCV was being distributed in this country through government institutions (for example, health departments and county hospitals) by the Merieux Institute in France. A domestic supply of HDCV is expected to be marketed in the future by Wyeth Laboratories. Thus, we stress the need for increased availability of HDCV and for a re-emphasis by public health and veterinary groups for pre-exposure immunization of those at risk.

References

1. Tierkel, E. A., and Sikes, R. K.: Pre-exposure prophylaxis against rabies. *JAMA* 201: 91-94 (1967).
2. Recommendation of the Public Health Service Advisory Committee on Immunization Practices: Rabies. National Communicable Disease Center. *Morbidity and Mortality Weekly Report* 16: 152-155 (1967).
3. U.S. Public Health Service Advisory Committee on Immunization

- Practices: Rabies prophylaxis. *Morbidity and Mortality Weekly Report* 29: 265-280 (1980).
4. Smith, J. S., Yager, P. A., and Baer, G. M.: A rapid reproducible test for determining rabies neutralizing antibody. *Bull WHO* 48: 535-541 (1973).
5. Colorado Department of Health: Mass rabies exposure—Ft. Collins. *Colorado Dis Bull* 8: 1 (1980).
6. Garner, W. R., Jones, D. O., and Pratt, E.: Problems associated with rabies pre-exposure prophylaxis. *JAMA* 235: 1131-1132 (1976).
7. Hafkin, B. M., et al.: A comparison of a WI-38 vaccine for pre-exposure rabies prophylaxis. *Am J Epidemiol* 107: 439-443 (1978).
8. Rosanoff, E. I., and Tint, H.: Responses to human diploid cell rabies vaccine: neutralizing antibody responses of vaccinees receiving booster doses of human diploid cell rabies vaccine. *Am J Epidemiol* 110: 322-327 (1979).
9. Plotkin, S. A.: Rabies vaccine in human cell cultures: progress and perspectives. *Rev Infect Dis* 2: 433-448 (1980).
10. Anderson, L. J., et al.: Postexposure trial of a human diploid cell strain rabies vaccine. *J Infect Dis* 142: 133-138 (1980).
11. Meyer, H. M.: Rabies vaccine. *J Infect Dis* 142: 287-289 (1980).

SYNOPSIS

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A serologic service for determin-

ing antibody levels due to prior rabies immunization was provided at an annual convention of the Tennessee Veterinary Medical Association in January 1977. A total of 26 veterinarians volunteered to participate, and only 2 had adequate serum levels of antibody related solely to a pre-exposure immunization. An addi-

tional six veterinarians had high titers of antibody—probably the result of post-exposure immunization after rabies-proved incidents. The level of protection for veterinarians appears to be low, which suggests a need for a re-emphasis on immunizations and for increased availability of the relatively new human diploid cell vaccine.