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Defining the Rabies Problem

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In the 1938 *Bulletin of the New York City Health Department* we read: "During the first eight months of 1937, eight rabid dogs were discovered in Brooklyn. In the last four months of that year 27 were encountered.... Besides this, there is the constant menace to persons because of bites inflicted by a rabid dog. In 1937, Brooklyn reported 8292 dog bites to the NYC Department of Health...and the number is increasing every year."¹

In the 1930s it was thought that if dog rabies were eliminated, the human problem would be solved. And by the late 1950s it appeared that rabies had indeed lost much of its potential as a public health problem, having been significantly reduced by mass dog vaccination programs. A turning point was reached in 1958, when rabid canine cases had been reduced by such a degree that they were surpassed by the increasing number of cases in wild animals—mostly foxes and skunks. The situation continued to improve. In the 1960s, there were "only" 16 human rabies deaths, whereas the previous decade had seen 113.

About 20,000 people were given postexposure prophylaxis (PEP) each year in the 1970s,² far fewer than the more than 50,000 people treated annually in the mid-1940s.³ New England and the Mid-Atlantic states reported an occasional rabid bat, and fox rabies was found in the northern counties of New York. The Southern states continued to have a steady but low rate of raccoon rabies. The Midwest had skunk rabies, as did California. Most Western states reported few if any animal rabies cases. The numbers continued to be low in the 1970s, but the epidemiology of the disease began to change in a disturbing manner in 1977–1978.

In the late 1970s, avid raccoon hunters in Virginia shipped in thousands of raccoons from Florida, including some that were rabid. All at once

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raccoon rabies cases began to occur on the border between Virginia and West Virginia. Since 1977 this outbreak has spread to within a few hundred yards of the Canadian border. If we look at New York City—which had been rabies-free since the early 1940s—we note that in the Bronx there were six rabid raccoons in 1992, nine in 1993, and five in 1994. Even Staten Island reported rabid raccoons (eight in 1992). All the New England states are also involved. Fortunately, the number of human rabies deaths continues at a level far below the level noted when canine rabies was rampant. And no transmission from rabid raccoons directly to humans has occurred. It is likely that raccoon rabies in the Northeast and Mid-Atlantic states will mellow into an endemic state, as occurred in the Southeast in the 1950s and 1960s.⁴

Yet human vaccination rates have skyrocketed, perhaps even higher than at the height of the canine rabies epidemic, when vaccination rates were 22 per 100,000 per year. As illustrated in the article by Kreindel et al. (p. 247), PEP use in Massachusetts went from a rate of 1.7/100,000 people per year before the raccoon rabies epidemic hit the state to 45/100,000 per year. Most treatments are due to exposure to *potentially rabid* domestic animals, not to raccoons, the predominant animal carrier of rabies. These aren't new findings and are remarkably similar to those reported in skunk rabies-affected Iowa in the 1950s,⁵ except that the vaccination rates in Massachusetts in the 1990s—where the concern is raccoon rabies—are much higher than in Iowa in the 1950s because raccoons are increasingly urban neighbors and thus increase the potential of transmission to domestic animals. In fact, the human vaccination rates may be a better "marker" of the current rabies problem in the United States than of the number of human deaths, as tragic as those are.

What can be recommended to improve rabies control efforts? Vaccinating dogs and cats against rabies is critical to maintaining the barrier between wild animals and humans. The articles by Patrick and O'Rourke (page 252) and Hensley (page 258) highlight the importance of keeping high rates of vaccination among both dogs and cats

since it is more difficult to assess the risk of rabies among the unvaccinated. These articles also highlight the need to keep populations of stray domestic animals in check.

Postexposure vaccination is expensive (approximately \$2200 per person) and many times administered after questionable "exposures." A study done some years ago points out the difference between human vaccination rates in states that carefully scrutinized each exposure and those that had less rigid guidelines: at times almost a tenfold difference.² Kreindel et al. estimate the total average direct costs associated with rabies PEP in Massachusetts in 1995 to be between \$2.4 million and \$6.4 million. Clearly, it would be a big advantage to have a better and less expensive treatment for exposed humans.

In addition to vaccinating exposed people or preventing rabies in domestic animals, there is a third approach to controlling the disease. Oral rabies vaccination has resulted in the elimination of fox rabies in France and most of Germany.⁶ However, the fox is the only species transmitting the disease in Western Europe; since other species such as the raccoon and the skunk exist in much greater numbers per square mile it will be more difficult to immunize the minimum percent required of these wild populations. Even so, oral rabies vaccination of wild animals has met with some success in the United States in limited areas,⁷ but its cost-effectiveness will have to be evaluated carefully. The soaring rates (and thus costs) of human PEP might make this a reasonable and attractive option. In addition, if an oral rabies vaccine for wild animals can be developed that will spread from one wild animal to another—something like the live polio vaccine—the picture would change markedly.

Until wild animal rabies can be eliminated, we will have to continue to maintain a permanent barrier of vaccinated dogs and cats and learn to live with the disease. But two definite ways that states and communities can reduce the burden of rabies are, first, to increase animal rabies vaccination to a level such that no unvaccinated dog or cat is involved in human exposures and, second, to carefully evaluate each human exposure and limit the use of PEP to life-threatening bites or scratches.

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