Editorial

Promising development for rabies control

Few countries in the world are free from rabies, and thousands of human deaths occur from the disease each year, mostly in Africa, Asia and Latin America. Any new development for its control is to be welcomed, and a technique just developed may offer an effective weapon.

Since the rabies virus is transmitted predominantly in the saliva of a biting, rabid animal and infection by this route is invariably fatal, an immune population cannot be established naturally. In Europe attempts to halt the spread of the disease have mainly been through poisoning or gassing the principal reservoir species, the red fox *Vulpes vulpes*, in which 70 per cent of all reported cases of rabies in Europe occur. One-and-a-quarter million foxes are killed annually in rabies control programmes in Europe, and in some places gassing of burrows and setts has also killed badgers, with the result that some populations have been locally exterminated. The number of rabies outbreaks has been reduced, but the disease front is still advancing.

According to R. Anderson writing in *Nature* (1986), an effective vaccination programme would be far preferable to mere destruction because an immune population is better able to limit the spread of a disease than a sparse but susceptible one. Until now prospects for such programmes have been limited by lack of a safe and effective vaccine that could be administered in baits in the wild. Live attenuated rabies virus has been used in baits to vaccinate foxes successfully, and field trials are in progress in Switzerland, West Germany and Canada. It is a controversial method, however, because the virus is often unstable, can retain pathogenicity for rodents, and there is a risk that it could revert to virulence. The other vaccination technique, using inactivated rabies virus, is ineffective when administered orally and so has limited application in wild populations.

A new vaccination strategy just developed holds more promise. A European research team (Blancou *et al.*, 1986) has developed a vaccine that overcomes these difficulties, being both safe for use in the wild and effective when administered orally. It consists of the relatively innocuous live vaccinia (cowpox) virus to carry the genetic code for the protein that occurs in the coat of the rabies virus, which is the only viral protein capable of inducing and reacting with virus-neutralizing antibodies and thus of conferring protection against rabies. When tested on European foxes this recombinant virus elicited the production of antibodies, which 28 days later enabled the animals to survive an injection of rabies virus. Similar experiments are in progress with other animal vectors of rabies, notably skunk and racoon, and field trials with wild populations of foxes will be carried out soon.

The development of this safe and effective vaccine is only a first step towards a successful vaccination programme to halt the spread of rabies. R. Anderson points out that, to block transmission of the disease, it is necessary that a sufficient proportion of the target population be immune, and this proportion increases with the density of the population. For example, where there are two foxes per sq km, 80 per cent of the population should be immune, and for a density of seven foxes per sq km, 95 per cent immunity is needed. Although in the European countryside fox density varies from 0.1 to 4 per sq km, in suburban/urban areas there may be as many as 10 foxes per sq km. The levels of immunity required would be difficult to achieve in many places, and to maintain them would require an annual immunization of the foxes born in that year.

It seems that the new vaccine would be useful in areas of low fox density, but in areas of high fox density mass vaccination would have to be supplemented by culling to reduce the target level of immunization required to prevent rabies persistence. This would be an improvement on current methods as far as wildlife populations are concerned, and in addition might halt the spread of the disease across mainland Europe and thus the effects of control programmes or rabies itself on as yet unaffected wildlife.

References

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