JOURNAL OF CLINICAL MICROBIOLOGY, Oct. 2001, p. 3808 Vol. 39, No. 10
0095-1137/01/$04.00+0 DOI: 10.1128/JCM.39.10.3808.2001

Letters to the Editor

Foot and Mouth Disease: a Revised Policy Is Required

Foot and mouth disease (FMD) is an economically important disease of cloven-hoofed animals and is probably the most contagious disease known to humanity. The complexity of the disease includes the host range of more than 33 domestic and wild cloven-hoofed animals. Although most of the countries in the European Union and in North America have controlled the disease by slaughter of infected and exposed animals, the disease is endemic to many countries of Africa, Asia, and South America. Regular prophylactic vaccination using an immunodominant local strain of the virus is therefore practiced in many countries as a primary control measure. However, vaccinated animals become seropositive for FMD and cannot be readily distinguished from infected animals. Also, the virus is able to persist in cattle and small ruminants irrespective of vaccination status. FMD-free countries have never used prophylactic vaccination for the disease control; rather, they have preferred to enforce a strict animal movement and slaughtering policy. Although this policy has been highly successful in limiting the extent of outbreaks and eliminating the infection, it is double edged. Primarily, cessation of vaccination leads to the animals' having almost no residual immunity, thus making them highly vulnerable to disease and resulting in the possibility of rapid dissemination of infection, particularly in densely populated areas. In fact, Europe's vulnerability has been underlined by the most recent outbreaks in Italy, Greece, and the United Kingdom, which stress the necessity of revising the policy of FMD-free countries (3, 4, 8).

In the face of the move toward globalization and highly mobile human populations, each country is facing threats of outbreaks due to emerging and reemerging infections. The FMD outbreak in the United Kingdom has been traced to meat imported illegally from West Asia. The virus can persist outside the host for more than a month and is dispersed by wind over long distances (60 to 250 km). In addition, inanimate objects (mechanical carriers) can transmit the virus from one place to another. Thus, a policy of slaughtering and restricting animal movement alone may not be the optimal solution to the present scenario when we consider the costs of implementing such control measures and the high loss of valuable livestock. Also, the disposal of thousands of animals per day by incineration or burial poses enormous logistical problems.

This may be the right time to consider vaccination with recombinant-based vaccines (encoding VP1 or whole-capsid protein) to retain an immunity level sufficiently high to resist outbreaks. The trials conducted have shown encouraging results in terms of immunity and protection (6, 7). Alternatively, one can consider the use of recombinant viral nonstructural proteins (3ABC and 2C) to distinguish between vaccinated and infected animals (5). This may overcome the inherent drawback of using conventional inactivated vaccines. Recently introduced ready-to-formulate oil adjuvants (Montanide series) have proven to maintain immunity for a long duration (≥6 to 8 months) (1) (P. K. Patil, J. Bayry, S. P. Nair, L. D. Misra, and C. Natarajan, submitted for publication). They have even proven to reduce contact transmission of the virus in sheep, which are the main virus carriers (2). Thus, regular annual vaccination by utilizing these new adjuvants as well as concentrated antigen maintained at international FMD banks would be another alternative. The maintenance of an increased level of immunity would prevent the buildup of high levels of circulating virus in populations close to disease foci, thus allowing the authorities more time to deal with slaughter and disinfection of contaminated areas. Therefore, we favor the use of one of these alternative approaches along with a slaughtering policy in disease-free countries.

REFERENCES

1. **Barnett, P. V., L. Pullen, L. Williams, and T. R. Doel.** 1996. International bank for foot-and-mouth disease vaccine: assessment of Montanide ISA 25 and ISA 206, two commercially available oil adjuvants. Vaccine **14:**1187–1198.
2. **Cox, S. J., P. V. Barnett, P. Dani, and J. S. Salt.** 1999. Emergency vaccination of sheep against foot-and-mouth disease: protection against disease and reduction in contact transmission. Vaccine **17:**1858–1868.
3. **Ferguson, N. M., C. A. Donnelly, and R. M. Anderson.** 2001. The foot-and-mouth epidemic in Great Britain: pattern of spread and impact of interventions. Science **292:**1155–1160.
4. **Kitching, R. P.** 1998. A recent history of foot-and-mouth disease. J. Comp. Pathol. **118:**89–108.
5. **Mackay, D. K., M. A. Forsyth, P. R. Davies, A. Berlinzani, G. J. Belsham, M. Flint, and M. D. Ryan.** 1998. Differentiating infection from vaccination in foot-and-mouth disease using a panel of recombinant, non-structural proteins in ELISA. Vaccine **16:**446–459.
6. **Morgan, D. O., and D. M. Moore.** 1990. Protection of cattle and swine against foot-and-mouth disease using biosynthetic peptide vaccines. Am. J. Vet. Res. **51:**40–45.
7. **Ward, G., E. Rieder, and P. W. Mason.** 1997. Plasmid DNA encoding replicating foot-and-mouth disease virus genomes induces antiviral immune responses in swine. J. Virol. **71:**7442–7447.
8. **Woolhouse, M., M. Chase-Topping, D. Haydon, J. Friar, L. Matthews, G. Hughes, D. Shaw, J. Wilesmith, A. Donaldson, S. Cornel, M. Keeling, and Bryan Grenfell.** 2001. Foot-and-mouth disease under control in the UK. Nature **411:**258–259.

Jagadeesh Bayry*
Srini V. Kaveri
INSERM U 430
Hopital Broussais
96, rue Didot
75014 Paris, France

*Phone: 33 1 43 95 95 89
Fax: 33 1 45 45 90 59
E-mail: srini.kaveri@brs.ap-hop-paris.fr