

MEASLES VACCINATION¹

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Measles poses severe health problems in developing countries because of prevailing malnutrition and the high risk of association with other concomitant infections. In such environments priority should be given to immunization programs using live measles vaccine.

Researchers originally developed both live attenuated and killed measles vaccines. The latter were found to give relatively poor immunity. Furthermore, they predisposed the recipients to immune-pathological complications upon infection with live virus. Use of the killed vaccines was therefore discouraged. However, it has recently been shown that the killed vaccines hitherto employed were lacking hemolysin, one of the major viral envelope components (1). Thus it appears that new types of killed vaccines containing all the essential envelope antigens could possibly provide good protection against measles.

Live attenuated vaccine has been applied on a large scale in both developing and developed countries. On the basis of the experience now available, this type of vaccine can be considered highly safe. The vaccine infection is mild, very seldom complicated, and a long-lasting (probably lifelong) immunity is established. The live vaccine is relatively labile, but modern freeze-drying techniques have provided products of good quality.

The medical problem posed by measles is strikingly different in the developed and developing countries. In developing countries, where it represents a major health threat, the only uncertainty about the

vaccine concerns the possibility of late sequelae. It is now well established that wild measles virus can cause subacute sclerosing panencephalitis (SSPE), and a possibly important role in regard to multiple sclerosis has also been discussed.

With regard to the vaccine virus' effect on the central nervous system, the frequency of acute encephalitis after vaccination is very low (2). Thus, in developing countries a major benefit of vaccination is sharp reduction or elimination of acute measles encephalitis, which normally occurs at a frequency of about one in every thousand measles cases.

Several observations indicate that the vaccine virus infection is much more restricted than infection with wild virus. The vaccine virus gives an infection which appears only infrequently to involve the central nervous system. Nevertheless, possible involvement of vaccine virus in late complications should be critically examined, since there are some indications from model systems that attenuated virus, as compared with wild virus, may be more prone to remain in the central nervous system and to cause late infections. Both the characteristics of the virus persisting in tissues and the immunologic reactions of the host should be examined.

Measles is serious in developing countries, occurring early in life and producing high mortality because of the frequent association with malnutrition and concomitant infections with other microorganisms. Case-

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fatality rates of between 5 and 15 per cent for children under the age of 10 have been reported (3). It is clear that the introduction of live measles vaccine in such environments should have high priority.

Many trials have been conducted with the vaccine (3, 4), and several different problems have been encountered. One of these has been, and still is, posed by the need to assure stability of the product. Another concerns the considerable practical difficulties that arise in trying to reach a larger part of the population at a selected target age. Yet another relates precisely to selection of the target age group to be immunized.

Obviously, vaccination has to be carried out early, in any case before the recipient reaches the age of three years. On the other hand, vaccination should not be carried out too early. In the first place, if it is done

before the age of one it may result in restricted virus replication, owing to the presence of maternal antibodies, and the immunity produced may be of relatively short duration. Furthermore, there are theoretical grounds for thinking it inadvisable to vaccinate too early, since about half of all SSPE cases examined have occurred in patients who experienced a measles infection before the age of two years.

Aside from organizational problems, the main obstacle to introduction of live measles vaccine in developing countries seems to be the cost of the vaccine (3).

In conclusion, it is recommended that the World Health Organization make further efforts to resolve the various problems just discussed, so that this preventable disease may be effectively reduced or eliminated in as many countries as possible, especially in the developing world.

SUMMARY

Prevention of measles poses different problems in developed and developing countries. In developed countries the risk of late complications following the use of live vaccine should be further evaluated; additional attempts might also be made to create new types of inactivated

vaccine. In developing countries the introduction of live measles vaccine should be given high priority. The main problems in developing areas appear to be ones relating to vaccine stability, distribution, and cost.

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