Interrupted immunisation

A course of immunisation that has been interrupted should not be started over again: the remaining dose or doses should be given as if a prolonged interval had not occurred. Although evidence to support this firm statement is incomplete and not available for all vaccines, it suffices to convince most authorities¹ and is adopted in the current DHSS recommendations for DTP and polio vaccines.² It should be added that it is also undesirable to restart an interrupted course of immunisation, because the frequency of side effects is liable to increase with the number of injections.

The need for a spaced course of injections arises because the first injection of a killed protein antigen usually stimulates only a primary immune response, which may generate little protection but leaves the immune system primed to respond well to a later injection, generally with the production of antibody in quantity—the secondary immune response. The state of secondary responsiveness takes time to develop, and it is necessary to observe a *minimum* interval of about 2 weeks between the first and second injections. The need to observe a maximum interval would arise only if the state of secondary responsiveness disappeared with the passage of time. This is possible, especially in the elderly, but normally responsiveness endures for several years after a primary injection of vaccine of adequate potency.^{3,4} Indeed, the degree of secondary responsiveness increases with time,⁵ although comparative studies of intervals longer than about 9 months do not appear to have been made in man. The spacing usually advised in national recommendations is therefore a compromise that secures an adequate secondary response without leaving the subject unprotected for too long and at the same time encourages a high vaccine uptake by employing convenient timings.

Depending on the nature of the vaccine, the use of adjuvants, the age of the recipient, and other factors, the recommended basic course of immunisation often includes a third or even a fourth injection after appropriate time intervals. But similar principles apply to these injections, as well as

to later reinforcing doses: the state of primed immune responsiveness remains for many years after 2 or more spaced doses of vaccine have been given.

In the case of most live vaccines, only a single dose is needed; the attenuated microbes in the vaccine induce a sub-clinical infection and a natural antibody response which is usually durable. The need for 3 spaced doses does arise, however, with live trivalent poliovaccine, to ensure that all 3 serotypes in the vaccine infect the recipient's gut. As with killed vaccine, it is necessary to observe a minimum interval between doses of live poliovaccine but for a different reason—because the gut may become infected by only one (or 2) of the vaccine strains after the first dose, the successful virus interfering with the growth of the others. After a few weeks the growth of the infecting virus will have stopped or diminished sufficiently to allow the other viruses given in the second (or third) dose to infect and multiply. Thus, as with killed vaccines, there is a minimum interval but not a maximum one; immunological memory, once established, is long lasting.

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