BCG - a partial solution

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BCG vaccination has been used extensively to prevent tuberculosis, first in mass vaccination campaigns and more recently in vaccinating newborn babies. However, its role in control activities is often not understood.

A first infection with the tubercle bacillus produces a certain level of cellular immunity but also carries the risk of causing active disease. BCG vaccination is given to produce the immunity without the risk of disease. BCG therefore can only protect those who are still uninfected; it cannot protect people who are already infected or those who could develop TB as a result of reinfection.

Consequently, the contribution that BCG can make to TB control is limited, since most cases occur among those already infected (one-third of the world population is already infected) and reinfection among adults may be quite common. Moreover, many people, especially in tropical countries, have a certain degree of natural immunity against tuberculosis derived from infection with environmental saprophytic mycobacteria. These variables in the TB ecosystem, as well as possible differences in the efficacy of BCG vaccines, explain the apparently controversial results observed in community trials of BCG vaccines.

Since BCG should be given before infection, it is indicated a priori for young children. Recent case/control and contact studies have shown that it provides substantial protection, especially against the serious disseminated forms such as tuberculous meningitis and miliary disease, which are most frequent among young children and are often fatal or leave sequelae, even if treated with modern drugs.

BCG vaccination should therefore be given as early in life as possible in any situation where the risk of TB infection is high or is rapidly declining but still exists. Prevention of childhood TB does not diminish the transmission of infection in the community because the most common forms of childhood TB are not infectious. However this does not imply that vaccination during childhood has no further contribution to make to TB control. BCG prevents blood-borne spread of an infection, and thus not only the immediate serious forms of childhood TB but also the establishment of foci, mainly pulmonary, which may produce disease later in life. This is called endogenous reactivation. It is interesting to note that when the risk of infection has become very low, practically all TB cases occur as a result of endogenous reactivation. So case-finding and treatment (generally considered the major TB control measures) will have less impact on the incidence, and preventive treatment will be less feasible because of the low risk among the still large numbers of infected individuals.

However, BCG vaccination given early in life – with its lasting effect on endogenous reactivation – will continue to reduce the incidence and thus hasten the eventual elimination of the disease.

Uninfected individuals in contact with TB patients are at a high risk of contracting the disease. Among them, notably medical personnel, screening for infection and preventive treatment is now often applied in preference to BCG vaccination, the efficiency of which has proved to be doubtful in adults. The emergence of infection with multidrug-resistant bacilli, however, has brought this practice into question.

BCG vaccination may cause disseminated BCGitis – illness caused by the vaccine itself – in cases of severe immunodeficiency. This has become of concern in view of the HIV-infection and AIDS epidemic. Several cases have been reported in HIV-infected infants but it was not observed in prospective studies. BCG vaccination continues to be recommended for asymptomatic children in countries where there is a high risk of TB infection. Where the risk is low, BCG may be withheld from children known or suspected of being HIV-infected. BCG should never be given to symptomatic HIV-infected individuals.

The best way to go about controlling tuberculosis is targeting infectious people in the community and providing them with treatment.

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