BCG Vaccination

It is now almost sixty years since BCG vaccine was introduced as a means of immunizing against tuberculosis. The vaccine was developed in its initial stages by Albert Calmette and Camille Guérin in the first decade of the twentieth century, on the postulate of Louis Pasteur that virulent microorganisms could be attenuated in such a way as to lose their infecting power while retaining their immunizing action. The original bacillus of Calmette and Guérin was a virulent bovine organism isolated by Edmond Nocard from a heifer with tuberculous mastitis. Growth on a nutritive medium containing bile was credited by Calmette and Guérin with the successful attenuation of the living organism.

In the early 1920's Calmette and Guérin, and particularly their colleague B. Weil-Hallé, began careful studies of the value of BCG vaccine in the protection of children against tuberculosis, which soon appeared so promising that not only in France but in many countries in which French scientific thought was influential, BCG vaccination against tuberculosis was practiced on a wide scale. In succeeding years such faith was put in the procedure in continental Europe that its use was made compulsory in certain situations, e.g., the induction of recruits in military service. In Scandinavia, on the basis of immunologic studies by Arvid Wallgren and others, a great development in practice took place.

Scandinavian workers were prominent in the public health practice of the United Nations, and partly at least because of that influence the World Health Organization and its subsidiary organization UNICEF made BCG vaccination a basic procedure in world-wide efforts to prevent tuberculosis. In the early years scientifically controlled studies were made. Later the vaccine was administered routinely. Long ago the number vaccinated passed the hundred million mark. Certain countries took the practice up with special vigor, notably Brazil and Japan. Many accounts are on record indicating the estimated success of the procedure in different nations.

Remarkably, in the midst of what was at least a restrained enthusiasm elsewhere, Great Britain and the United States remained aloof from the practice, in spite of the fact that some of the best controlled and most widely cited studies on BCG vaccination, quite favorable in their import, emanated from these countries. In the late 1950's, however, a remarkable change in attitude took place in Great Britain, on the basis of belated but well controlled and thorough trials conducted under the sponsorship of the Medical Research Council, through its Tuberculosis Vaccine Clinical

Trials Committee. These studies indicated a significant efficacy in BCG vaccination, and induced a favorable attitude, which still prevails.

In the United States, on the other hand, in spite of consistently favorable pronouncements by official bodies on the value of BCG vaccination under certain conditions, actual use of the vaccine has remained limited. Public health authorities lay great stress on the value of the tuberculin test in diagnosis, and cite the loss of value of the test in vaccinated persons as reason for avoiding the use of BCG, which induces the tuberculin-positive state artificially. Also a steady and impressive decline in the prevalence and mortality of tuberculosis has eliminated much of the incentive for immunizing preventive procedures.

Coincident with the development and progress of BCG vaccination, there have been many efforts to use attenuated tubercle bacilli of other origin or other antigenically related mycobacteria, such as the turtle bacillus and the vole bacillus, as the immunizing organism. Some successes and not a few failures have been reported. These studies have, however, left alive the view that use of an avirulent mycobacterium as an immunizing agent may protect an animal from the invasive action of a virulent mycobacterium. An abundance of immunologic studies have indicated a close antigenic relationship based on the common possession of certain specific proteins.

Such views apply to tuberculosis and in apparently equal measure to leprosy. If avirulent mycobacteria other than the tubercle bacillus can protect against tuberculosis, is it not possible that an avirulent tubercle bacillus, or specifically, BCG, might protect against leprosy? Such considerations were in the mind of J. M. M. Fernández when he initiated trials in 1939 of the effect of BCG vaccination on the lepromin reaction. Numerous studies of the effect of BCG vaccination in the prevention of leprosy were made subsequently.[1] The latest and perhaps most impressive of these is that reported by J. A. Kinnear Brown and associates[2] to which reference is made elsewhere[3] in this issue of THE JOURNAL. —E. R. LONG

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[1]See, for example, FERNANDEZ, J. M. M. Influence of the tuberculosis factor on the clinical and immunological evolution of child contacts with leprosy. Internat. J. Leprosy **23** (1955) 243-258, and CHAUSSINAND, R. A propos de l'experimentation de la vaccination par le BCG dans la prophylaxie de la lèpre. *Ibid* **23** (1955) 270-279. See also in this connection: SCOTT, G. C., WIGLEY, S. C. and RUSSELL, D. A. The Karimui trial of BCG. 2. Tuberculin reactions in a leprosy-endemic but tuberculosis-free population. This issue of THE JOURNAL, pp. 139-146.

[2]BROWN, J. A. K. and STONE, M., with an appendix by Ian Sutherland. BCG vaccination of children against leprosy: First results of a trial in Uganda. Brit. Med. J. **1** (1966) 7-14.

[3]REES, R. J. W. BCG vaccination against leprosy. Internat. J. Leprosy **34** (1966) 186-190. (*Editorial*)