

of tuberculosis than their white neighbours,² and for this reason most have BCG given in infancy. Figures on the degree of tuberculin positivity in early childhood after BCG vaccination in infancy have been reported from around the world but Capewell and Leitch make the point that positive tuberculin tests should be viewed in the context of the tuberculin profile of the local population.³ A strongly positive Heaf test (grade 3 or 4) occurred in only 2% of our sample population.

An ethnically similar population to that reported here was studied in Birmingham by Grindulis.⁴ The tuberculin positivity was assessed at 22 months of age and 50% of the children had a negative response to Mantoux 10 tuberculin units and 25% were found to have no BCG scar. In contrast all our children had visible scars and only 14% were entirely Heaf negative. This may reflect the effectiveness of a standardised vaccination procedure.¹ Strongly positive tuberculin reactions were rare in both studies (H Grindulis, personal communication). It should be pointed out, however, that the jet injection technique used in Derby is no longer recommended for BCG.

The increased risk to Asian children in Britain may be related to the ease of travel abroad and to relatives visiting. Many Asian children are seen at contact clinics and Ormerod has recently shown the effectiveness of a programme of chemoprophylaxis in this group.⁵ The British Thoracic Society recommendations do not give clear guidelines on the management of the Asian child contact with pre-

vious BCG.⁶ The results of this study suggest that the British born Asian child should be treated like his white counterpart.⁶ When seen as a tuberculosis contact a strongly positive Heaf test should be taken as suggestive of recent infection, whether or not the child has previously had BCG. Such children should be carefully reviewed and considered for chemoprophylaxis or prolonged follow up.

We should like to thank the staff of the Derby Chest clinic for their help. We are most grateful to Ranjit Bains, Harmesh Ark, and Jaspal Dosanjh for their help with interpreting.

References

- 1 Hadfield JW, Allan J, Windebank WJ. Tuberculin sensitivity after neonatal BCG vaccination. *Br Med J* 1986;**292**:990-1.
- 2 Medical Research Council Tuberculosis and Chest Diseases Unit. Tuberculosis in children; a national survey of notifications in England and Wales in 1983. *Arch Dis Child* 1988;**63**:266-76.
- 3 Capewell S, Leitch AG. Tuberculin reactivity in a chest clinic: the effects of age and prior BCG vaccination. *Br J Dis Chest* 1986;**80**:37-44.
- 4 Grindulis H, Baynham MID, Scott PH, Thompson RA, Wharton BA. Tuberculin response two years after BCG vaccination. *Arch Dis Child* 1984;**59**:614-9.
- 5 Ormerod LP. Reduced incidence of tuberculosis by prophylactic chemotherapy in subjects showing strong reactions to tuberculin testing. *Arch Dis Child* 1987;**62**:1005-8.
- 6 Joint Tuberculosis Committee of the British Thoracic Society. Control and prevention of tuberculosis: a code of practice. *Br Med J* 1983;**287**:1118-21.

Correspondence to Dr AH Thomson, University Department of Child Health, Clinical Sciences Building, Royal Infirmary, PO Box 65, Leicester LE2 7LX.

Accepted 8 August 1988

Tuberculin response after neonatal BCG vaccination

L P ORMEROD AND J M GARNETT

Chest Clinic, Blackburn Royal Infirmary, Blackburn

SUMMARY Of a total of 846 children of Indian subcontinent ethnic origin given neonatal BCG vaccination, 823 (97%) were tuberculin positive when tested six to nine weeks after vaccination. The results show an initial immunological response to the vaccination. The possible reasons for the disparity between these results and others are discussed.

BCG vaccination shortly after birth in children of Afro-Asian ethnic origin is recommended by the Joint Tuberculosis Committee.¹ It has been routine policy to offer neonatal BCG to children of Indian

subcontinent ethnic origin in Blackburn since 1963. After the report of Grindulis *et al* that showed a poor immunological response at 22 months after such vaccination,² a prospective study of early response to BCG vaccination was undertaken.

Subjects and methods

A total of 863 neonates of Indian subcontinent ethnic origin received BCG vaccination by intradermal injection from the resident paediatric medical staff between August 1984 and July 1985 inclusive. Home visits were carried out by community nursing staff and a tuberculin test carried out and read

72 hours later. Initially we planned to perform the tuberculin test at eight weeks after vaccination, but due to various reasons—for example, change of address, visits to relatives, hospitalisation, and intercurrent illness—in practice this was carried out from six to nine weeks after vaccination.

Of the 863 vaccinated children, 846 had a tuberculin test performed. Parents of two children refused permission, 15 had moved and could not be traced by nine weeks after vaccination. The tuberculin test used was the Tine test (Lederle). The reaction was graded 0–4, as with the Heaf test, reaction 0 being negative, grades 1–4 being positive. The presence of local BCG abscesses was also recorded.

Results

The results are shown in the table. Twenty four children had small subcutaneous abscesses, with peak numbers found in those vaccinated in August (n=6) and February (n=5) at times of medical staff changeover. Twenty abscesses settled with dry dressings or aspiration, or both; four children were given short courses of topical or oral isoniazid.

Discussion

The results of this prospective study of a cohort of neonatally vaccinated children over one year shows that, as judged by a positive tuberculin test, they have developed an immunological response by age 9 weeks. Two recent reports of response to vaccination neonatally or at 3 months also showed a very high positive tuberculin reaction rate. Hadfield and Allen prospectively showed a 98.3% positive Heaf test result three months after neonatal subcutaneous BCG given by Dermojet injector in Derby.³ Packe and Innes, in a case-control study, showed a 94% positive tuberculin positive rate assessed three months after vaccination at age 3 months.⁴

Table *Results from neonates vaccinated*

Age (weeks)	Total No tested	No tuberculin positive*	No (%) tuberculin negative
6	239	235	4 (1.7)
7	183	181	2 (1.1)
8	309	295	14 (4.7)
9	115	112	3 (2.7)
Total	846	823	23 (2.7)

*All positive tuberculin reactions were grade 1 or 2. Analysis by χ^2 showed the only difference between the age groups was that infants aged 8 weeks had significantly more tuberculin negatives than those aged 9 weeks (χ^2 4.31, 0.05 > p > 0.01).

The results reported by Grindulis *et al* are at variance with the results reported here,² and those from Derby and Birmingham, when tuberculin status was assessed two to three months after vaccination. A large number of factors determine whether tuberculin sensitivity develops after BCG vaccination, its initial strength, and the persistence of such tuberculin sensitivity.⁵

There are two possible explanations for the discrepancy between Grindulis's children and those reported here and elsewhere.^{3,4} (1) Grindulis's children did not have a high percentage of initial tuberculin positivity after vaccination. This could have been due to faulty vaccination technique, but this is unknown because no initial tests were carried out. (2) Although tuberculin sensitivity seems stable in older white children after BCG vaccination,⁶ this sensitivity may not be stable in children from the Indian subcontinent ethnic group who have a different risk of tuberculosis in the United Kingdom.

It is likely that routine BCG vaccination at age 13 will be phased out by 1990 in England and Wales, and the only protection given to children of Afro-Asian ethnic origin will be that given to them by neonatal BCG. In view of the discrepancy between the early results of tuberculin testing in this ethnic group after BCG, and that reported two years after vaccination,² it is important to know the result of serial tuberculin tests in the Indian subcontinent ethnic group to see if there is a difference from the white ethnic group. We intend to carry out a further prospective study of a random proportion of the children reported in this paper, to assess their tuberculin response, four years after vaccination.

References

- 1 Joint Tuberculosis Committee of the British Thoracic Society. Control and prevention of tuberculosis; a code of practice. *Br Med J* 1983;**287**:1118–21.
- 2 Grindulis H, Bayham MI, Scott PH, Thompson RA, Wharton BA. Tuberculin response two years after BCG vaccination at birth. *Arch Dis Child* 1984;**59**:614–9.
- 3 Hadfield JW, Allen J. Sensitivity of neonates to tuberculin after BCG vaccination. *Br Med J* 1986;**292**:990–1.
- 4 Packe GE, Innes J. Protective effect of BCG immunisation in infant Asians: a case-control study. *Arch Dis Child* 1988;**63**:277–81.
- 5 Snider DE. Bacille Calmette-Guerin vaccinations and tuberculin skin tests. *JAMA* 1985;**253**:3438–9.
- 6 Horowitz O, Bunch-Christensen K. Correlation between tuberculin sensitivity after 2 months and 5 years among BCG vaccinated subjects. *Bull WHO* 1972;**47**:49–58.

Correspondence to Dr LP Ormerod, Chest Clinic, Blackburn Royal Infirmary, Bolton Road, Blackburn, Lancashire BB2 3LR.

Accepted 5 August 1988