

가 BCG 가

- PPD -

= Abstract =

Tuberculin Reactivity in Neonates Vaccinated with BCG at Primary Care Clinics - With Two Types of BCG Vaccine and Two Strengths of PPD -

Wan Ju Kim, M.D., Sun Ho Lee, M.D., Sang Yoon Ahn, M.D.
Seung Jae Yang, M.D. and Sung Hee Oh, M.D.

Department of Pediatrics, College of Medicine, Hanyang University, Seoul, Korea

Purpose : The number of newborns vaccinated with BCG of Tokyo 172 strain, which has been claimed to cause lesser degree of local adverse events including scar, has recently been increasing. However, tuberculin response to this vaccine has inadequately been studied, especially with newborns cared at primary care clinics. We, therefore, performed a study in newborns vaccinated with BCG at private pediatric offices and evaluated the response to PPD 2TU or PPD 5TU following vaccination with percutaneous or intradermal BCG.

Methods : Two hundred infants who had been cared at three private pediatric offices were retrospectively enrolled in the study. One hundred fifty one infants had received percutaneous BCG(Tokyo strain); 129 infants had had tuberculin test with PPD 2TU and the rest of 22 infants with PPD 5TU. Forty nine infants had received intradermal BCG(28 infants Copenhagen strain, 1 infant French strain, 20 infants unknown); 35 infants had had tuberculin test with PPD 2TU, 14 infants(11%) with PPD 5TU.

Results : In infants vaccinated with percutaneous BCG, the mean induration diameter in tuberculin test was significantly greater with PPD 5TU($12.4 \pm 3.5\text{mm}$) compared to PPD 2TU($9.2 \pm 4.4\text{mm}$). In infants vaccinated with intradermal BCG, the mean induration diameters in tuberculin test were $5.7 \pm 5.1\text{mm}$ to PPD 2TU and $6.6 \pm 4.8\text{mm}$ to PPD 5TU, which were not significantly different. The tuberculin response to PPD 2TU was significantly greater in infants vaccinated with percutaneous BCG compared to those with intradermal BCG. The tuberculin response to PPD 5TU was also significantly greater in infants vaccinated with percutaneous BCG compared to those with intradermal BCG.

Conclusion : Percutaneous BCG(Tokyo strain) seems to cause greater response to tuber-

culin compared to intradermal BCG and PPD 2TU induces weaker response compared to PPD 5TU. Acknowledging some discrepancies from the previously reported data, which might have been due to the different source of the study subjects, more studies are needed to establish the range of tuberculin response following BCG vaccination in order to differentiate from tuberculosis.

Key Words : BCG, PPD, Tuberculin response, Tuberculosis

1.

1997 2 2001 6
1 BCG
200

Tokyo 172
copenhagen French 1173P
BCG
1990 1.8%, 1995 1.0% 30
1990 27.3%, 1995 15.5%

1).

BCG
1998 PPD 5TU

PPD 2TU

, BCG

26G PPD 0.1

mL

6~10 mm

. PPD 48~72

1

2).

BCG

BCG

가 5 mm

, 5 mm

2.

SPSS 8.0

가

t-test

$P<0.05$

BCG
BCG

tokyo 172

가

가

가

BCG

가

BCG

BCG

, 5TU PPD 2TU PPD

200 112 (56%), 88
(44%) BCG 16~36 (
26.1±9.9) PPD
4.9±3.6 BCG PPD

4.0±3.6

200

Tokyo 172 (Japan BCG Labra-

Table 1. Strains of BCG Vaccines and PPD Strength Utilized in the Study

BCG strain	Route of administration	PPD Strength	
		2TU	5TU
Tokyo172	Subcutaneous	129(64.5%)	22(11.0%)
Copenhagen	Intradermal	22(11.0%)	6(3.0%)
French 1173P2	Intradermal	1(0.5%)	0(0.0%)
Unknown	Intradermal	12(6.0%)	8(4.0%)

tory Co.) 가 151 (75.5%)
. 49 (24.5%) { France Me-
rieux copenhagen 1331 28 (14%),
French 1173P2 1 (0.5%), 20 (10%) }
Tokyo 172 151 2TU PPD
가 129 (64.5%), 5TU PPD
가 22 (11.0%) , copenhagen
28 2TU PPD 가 22 (11.0
) , 5TU PPD 가 6 (3.0%) ,
French 1173P2 1 (0.5%)
2TU PPD . BCG
2TU PPD 가 8 (4.0%), 5TU
PPD 가 12 (6%) (Table 1).

(Fig. 1, 2) BCG BCG
PPD 2TU PPD 5TU
BCG 2TU PPD
5TU PPD ()
9.2±4.4 mm(86.8%), 12.4±3.5 mm(95.5%) 5TU
PPD 2TU PPD
(P=0.02) 0
BCG 2TU PPD 5TU PPD
() 5.7±5.1 mm(60.0
%), 6.6±4.8 mm(71.4%)
가 (P=0.569).

, 2TU PPD
BCG ()
9.2±4.4 mm(86.8%), BCG
5.7±5.1 mm(60.0%) BCG
BCG
(P<0.001). 5TU PPD

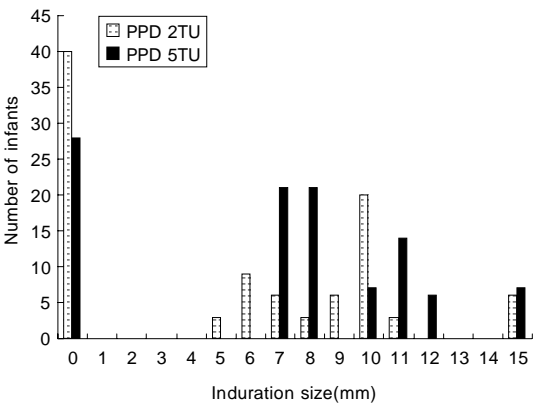


Fig. 1. Distribution of induration diameter on tuberculin tests in infants vaccinated with intradermal BCG.

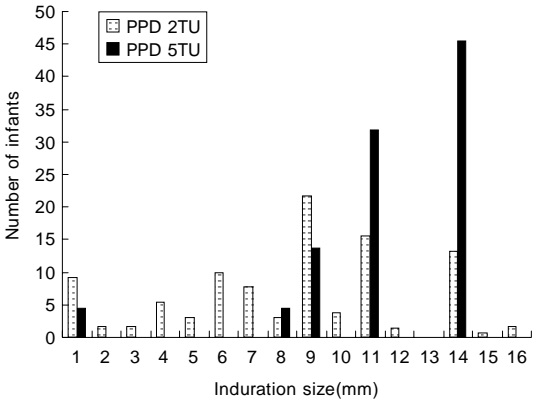


Fig. 2. Distribution of induration diameter on tuberculin tests in infants vaccinated with percutaneous BCG.

BCG ()
12.4±3.5 mm(95.5%), BCG
6.6±4.8 mm(71.4%) BCG
BCG

Table 2. Magnitude of Induration on Tuberculin Test Performed after BCG Vaccination

Route of BCG vaccination	PPD strength					
	2TU			5TU		
	n	Induration *	%Positive	n	Induration *	%Positive
Percutaneous(n=151)	129	9.2±4.4 mm	86.8%	22	12.4±3.5 mm	95.5%
Intradermal(n=49)	35	5.7±5.1 mm	60.0%	14	6.6±4.8 mm	71.4%

*mean± D

(P< 0.001, Table 2).

75%

¹²⁾. Tokyo 172

45

(virulence)

가

가

BCG

1930

1970

0~80%

,

가

,

WHO가

8 ~ 10

Tokyo

가

³⁾.

172 가

¹³⁾.

BCG

BCG

가

가

BCG

53~74%

4~9)

가

BCG

6

,

417 가

84

(20.1%)

BCG

806

가

45 (5.6%)

74%

. 1940

¹⁰⁾.

90%

4

40

가 BCG

French 1173 P2, Danish 1331,

1990

BCG가

Glaxo 1077 Tokyo172 , French

가

1173 P2 Danish 1331 Glaxo 1077 Tokyo172

가

.

,

¹¹⁾. BCG

가 가

WHO가

, BCG

Glaxo

가

1077 60~80%, Tokyo 172 60~95% ,

.

Glaxo 1077 24~50%, Tokyo 172

1890 Robert Koch

39~53%

French 1173 P2 70~

M. tuberculosis

12.4±3.5 mm

Seibert Munday¹⁴⁾ (95.5%)

BCG

PPD 1958 가 BCG

UNICEF PPD 2TU

PPD RT23 Statens Serum 5.7±5.1 mm(60.0%) 2000 ¹⁹⁾

Institute(SSI, copenhagen) 7.7±2.3 mm(80.7%)

¹⁵⁾, 1960

가 BCG 2TU PPD

가

1TU PPD RT23 , 9.2±4.4 mm(86.8%)

5TU PPD BCG 2TU PPD

RT23 BCG BCG 5TU PPD

. 1998 2TU PPD RT23 가

, BCG BCG

가 PPD , PPD 5TU가 PPD

2TU

BCG

가 BCG PPD

BCG(Copenhagen BCG

1331) 가 , 2TU PPD 5TU

PPD 5TU 1993 PPD

¹⁶⁾ () , 2TU PPD

10.6±3.8 mm(85.8%), 1997 ¹³⁾

7.2±4.4 mm(75.8%) , 가

BCG(French 1173P2) BCG

가 1997 ¹⁷⁾ ,

84.2% BCG

가 BCG

PPD 5TU 6.6±4.8 mm(71.4%)

가

BCG PPD 5TU 가

가 1997 가

1997 ¹³⁾ 10.3±3.2 가

mm(97.7%), 2000 ¹⁸⁾ 가

10.6±3.9 mm(93.7%)

BCG

가 : BCG

, , , , 2TU PPD 5TU PPD BCG
가
BCG 5TU PPD 가 2TU
PPD
BCG
가
BCG 가
BCG 5TU
PPD 2TU PPD
: 1997 2 2001 6
1 BCG
200
151 Tokyo 172
49 (28 : copenhagen ,
1 : French 1173P2 , 20 :)
151 129 (64.5%) 2TU, 22 (11%)
5TU PPD 49 35
(17.5%) 2TU, 14 (7%) 5TU PPD
: BCG 2TU PPD
5TU PPD () 9.2±4.4
mm(86.8%), 12.4±3.5 mm(95.5%) 5TU PPD
가 2TU PPD
($P=0.02$).
BCG 2TU PPD 5TU PPD
() 5.7±5.1 mm(60%),
6.6±4.8 mm(71.4%)
가 ($P=0.569$). 2TU PPD
BCG ()
가 9.2±4.4 mm(86.8%), BCG
5.7±5.1 mm(60%) BCG
가 BCG
($P<0.001$). 5TU PPD
BCG
() 12.4±3.5 mm(95.5%), BCG
6.6±4.8 mm(71.4%) BCG
가 BCG
($P<0.001$).
: BCG(Tokyo 172)

- 1) , . 7
. 1995:8-12.
- 2) . 5
: 2002:35-47.
- 3) Tuberculosis Prevention Trial. Trial of BCG vaccine in South India for tuberculosis prevention : First report. Bull World Health Organ 1979;57:819-27.
- 4) Stanford JL, Cunningham A, Pilkinton A, Sargeant I, Series H, Bhatti N, et al. A prospective study of BCG given to young children in Agre, India-A region of high contact with environmental mycobacteria. Tubercle 1987;68:39-49.
- 5) Curtis HM, Leck I, Bamford FN. Incidence of childhood tuberculosis after neonatal BCG vaccination. Lancet 1984;1:145-8.
- 6) Tidjani O, Amedome A, Dam HG. The protective effect of BCG vaccination of the newborn against childhood tuberculosis in an African community. Tubercle 1986;67:269-81.
- 7) Menzine R, Vissandjee B. Effect of BCG vaccination on tuberculin reactivity. Am Rev Respi Dis 1992;145:621-5.
- 8) Packe GE, Innes JA. Protective effect of BCG vaccination in infant Asian; a case control study. Arch Dis Child 1988;63:277-81.
- 9) Colditz GA, Brewer TF, Berkeg CS, Wilson ME, Burdick E, Fineberg HV, Mosteller F. Efficacy of BCG vaccine in the prevention of tuberculosis meta-analysis of published literature. JAMA 1994;271:698-702.
- 10) , . 7

- . 1995:8-12.
- 11) Smith D, Harding C, Chan J. Potency of 10 BCG vaccines organized by the IABS. J Biol Stand 1979;7:179-97.
- 12) Tuberculosis Control Program and Expanded Program on Immunization. Efficacy of infant BCG immunization. Wkly Epidemiol Rec 1986; 28:216-8.
- 13) , , . BCG . 1997;40:489-96.
- 14) Seibert FB, Munday B. The chemical compositions of the active principle of tuberculin. XV. A precipitated purified tuberculin protein suitable for the preparation of a standard tuberculin. Am Rev Tuberc 1932;25:724-37.
- 15) Milstian JB, Gibson JJ. Quality control of BCG vaccine by WHO; A review of factors that influence vaccine effectiveness and safety. Bull World Health Organ 1990;68:93-108.
- 16) , , , , . BCG . 1993;36:1300-7.
- 17) , , , . BCG . 가 1997;18:1390.
- 18) , . B.C.G. (Tokyo 172) . 2000;7:201-10
- 19) , . BCG 2TU PPD RT23 . 2000;43:1418-22.