

BCG PPD 1TU, 2TU 5TU

= Abstract =

The Effect of Percutaneous Multiple Puncture BCG Vaccination on PPD 1TU, 2TU and 5TU Tuberculin Skin Test

Bo Sun Kim, M.D., Min Ho Hwang, M.D., Chang Hwi Kim, M.D.
Jae Ok Park, M.D. and Sang Man Shin, M.D.

Department of Pediatrics, College of Medicine, Soonchunhyang University, Bucheon, Korea

Purpose : Recently in Korea since 1998, 2TU has been used instead of 5TU, which caused a confusion in interpreting tuberculin skin tests. We compared the tuberculin skin reaction to PPD(purified protein derivatives) 1TU, 2TU and 5TU.

Methods : We studied tuberculin skin reaction to PPD 1TU, 2TU and 5TU on 92 infants who were vaccinated with percutaneous multiple puncture BCG vaccine(Tokyo 172 strain, Japan BCG Laboratory Co.) in neonatal period. Diameters of indurations were measured in millimeters 48-72 hours after the intradermal injection of PPD 1TU, 2TU and 5TU.

Results : Among 92 infants(male : 56, female : 36), 1TU was used on 31 infants, 2TU on 31 infants and 5TU on 30 infants for tuberculin skin test. The mean diameter of induration for PPD 1TU, 2TU and 5TU were 5.7 ± 4.2 mm, 7.1 ± 3.7 mm, and 9.2 ± 4.2 mm, respectively. There was no statistical difference in mean diameter of induration between 1TU and 2TU. However, when tested with 5TU, the diameter of induration was significantly larger than those of PPD 1TU and 2TU($P < 0.05$). Six subjects(19.4%) tested with 1TU, 9 subjects(29%) tested with 2TU and 16 subjects(53.3%) tested with 5TU had diameter of 10 mm or more. There was no statistical difference between 1TU and 2TU but for 5TU, number of subjects with diameter of 10 mm or more was significantly higher than PPD 1TU and 2TU ($P < 0.05$). Number of subjects with induration diameter of 5 mm or more for 1TU, 2TU and 5TU was 19(61.3%), 22(71.0%) and 26(86.7%), respectively. However, there was no statistical difference.

Conclusion : A new standard criteria for interpreting the tuberculin skin test with PPD 2TU should be established for clinical diagnosis of tuberculosis.

Key Words : Tuberculin skin test, Percutaneous multiple puncture BCG

(Tokyo 172 strain, Japan BCG Laboratory Co.)

BCG 3
4 PPD 1TU, 2TU
5TU 92 (:56
, :36) (Table 1).

2.

1965 5.1% 1985 2.5%, 1990
1.8%^{1, 2)}, 1995

BCG 4

30.8%, 0.8%

³⁾.

BCG(Bacille Calmette-Guérin)

BCG

1921

⁴⁾

1.5 cm,

3 cm

5 mm 가 9 가

2 cm

4

French

가

Tokyo 가

T-

tuberculoprotein

4

26G

PPD

^{5 7)} 5TU PPD(purified protein derivatives)

1TU, 2TU
5TU(Statens Serum Institut, Den-

mark)

0.1 mL

가 1TU

6 mm

1998

5TU

2TU

가

48 72

2TU 5TU

(induration)

가

mm

4

BCG

PPD 1TU, 2TU 5TU

3.

SPSS 10.0

ANOVA Chi-square test

$P < 0.05$

1.

2000 1 2000 8 8

가 ,

92 (:56 , :36) 31

1TU, 31 2TU 30 5TU

4

(Table 1).
 ITU 가 0 mm 가 가
 7 mm, 6 mm .
 2TU 8 mm가 가 3
 mm, 6 mm, 10 mm가 . 5TU 13
 mm 6 mm 가 가 (Fig. 1).
 PPD 1TU, 2TU 5TU
 5.7±4.2 mm, 7.1±3.7 mm,
 9.2±4.2 mm ITU 2TU
 가 5TU
 PPD 1, 2TU 가
 (P<0.05)(Table 2).
 PPD TU
 가 10 mm
 ITU 31 6 (19.4%), 2TU 31
 9 (29%), 5TU 30 16 (53.3%)
 ITU 2TU 가

Table 1. Characteristics of Study Subjects

Sex	No.(%)
Male	56(60.87)
Female	36(39.13)
PPD TU	
ITU	31(33.55)
2TU	31(33.55)
5TU	30(32.90)

No. :No. of subjects

5TU PPD
 (P<0.05)(Table 3). 가 5 mm
 ITU, 2TU, 5TU가 31 19
 (61.3%), 30 22 (71.0%), 30 26 (86.7
 %) 5TU 가
 (Table 3).

Table 2. Comparison of Induration Size According to PPD TU

	ITU	2TU	5TU
Induration(mm)	5.7±4.2	7.1±3.7 [†]	9.2±4.2 [*]

Values are mean ± standard deviation, ^{*}P<0.05 compared with PPD 1TU and 2TU by ANOVA test, [†]P 0.05 compared with PPD 1TU by ANOVA test

Table 3. Comparison of Reactivity to Mantoux Test According to PPD TU after Percutaneous Multiple Puncture BCG Vaccination

Diameter of induration	No. of subjects(%)		
	ITU	2TU	5TU
10 mm	6(19.4)	9(29.0) [*]	16(53.3) [†]
5-9 mm	13(41.9)	13(42.0)	10(33.4)
<5 mm	12(38.7)	9(29.0)	4(13.3)
≥5 mm	19(61.3)	22(71.0)	26(86.7) [†]

^{*}P 0.05 compared with PPD 1TU, [†]P<0.05 compared with ITU and 2TU, [‡]P 0.05 compared with PPD 1TU and 2TU

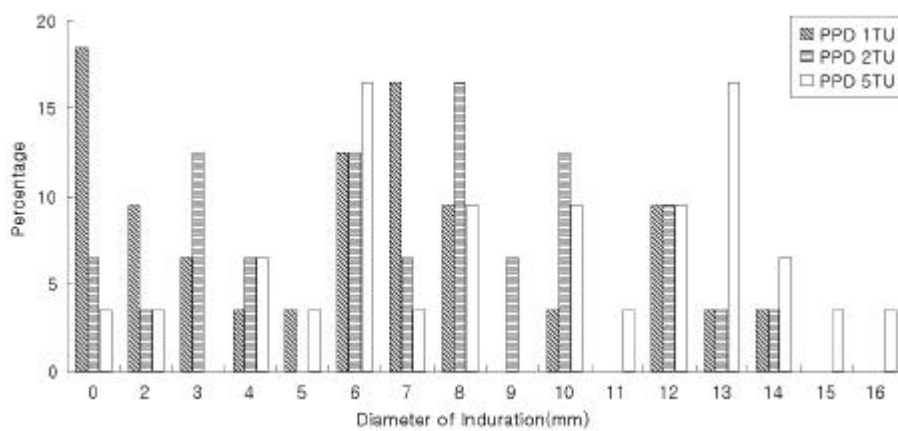


Fig. 1. Distribution of induration diameter according to PPD TU.

BCG ITU 13.81±4.48 , 2TU
 13.06±4.18 , 5TU 13.07±3.07 .

PPD ITU 5TU
 PPD 5TU가
 1998 PPD 2TU가

5TU
 가 10 mm , 4

가 , BCG 가

가 가 15 mm

가

가 (HIV) 5

mm ¹⁰⁾
 T- 2TU 가

가 ^{5 7)} . BCG 5 mm, BCG 10 mm

BCG

BCG ¹¹⁾
¹²⁾ 5TU 10.6±

BCG ^{5 7)} . 2.8 mm, 9.3±2.7 mm
 가 10 mm 65.8%, 37.7%

(heat-sterilizing and filtering culture) old tuberculin(OT) (active protein substance) 가 ¹³⁾ 5TU 11.2±3.7 mm,
 PPD . Seibert Munday⁸⁾ 11.0±2.9 mm 가 10 mm 73.9%,
 PPD ITU 250TU ITU
 . OT ITU 0.01 mg/dose, PPD ITU 76.6% ITU
 0.00002 mg/dose 가 5.1±

RT 23/Tween 80 PPD 2TU 0.1 mL 3.9 mm, 6.7±3.9 mm
 (0.00004 mg/dose PPD RT 23) ⁹⁾ 15.1%, 23.6% 5TU

가 ITU . 가 .

PPD 2TU

¹⁴⁾ 106 5TU 2TU

2TU

10.3 mm , 5TU : 1998 5TU

14.4 mm 2TU

가 , 5TU 가 가 5TU 2TU

2TU 가 가 가

PPD 2TU 4

BCG

5TU PPD 1TU, 2TU 5TU

6 mm , 10 mm

: 2000 1 2000 8 8

가 ,

¹⁵⁾ 1 BCG

6 2TU 4

7.32±3.2 mm (Tokyo strain, Japan BCG Laboratory Co.) BCG

PPD 1TU 5TU 92 (:56 , :36)

4 PPD 1TU, 2TU 5TU

¹⁶⁾ 1 BCG

200 3 2TU PPD SPSS 10.0

RT 23 5TU ANOVA, Chi-square test $P<0.05$

PPD RT 23 , 2TU PPD

RT 23 가 :

1) 92 31 ITU, 31 2TU

30 5TU

2TU 5TU 5.7±4.2 mm, ITU 가

7.1±3.7 mm, 9.2±4.2 mm 5TU PPD 1, 0 mm 가 가 7 mm,

2TU 가 6 mm . 2TU 8 mm가

2TU ITU 5TU 가 3 mm, 6 mm, 10 mm가

PPD TU . 5TU 13 mm 6 mm가 가

가 10 mm ITU 2TU 2) PPD 1TU, 2TU 5TU

가 5TU 5.7±4.2 mm, 7.1±3.7 mm, 가

PPD 9.2±4.2 mm ITU 2TU 가

가 5 mm ITU, 2TU, 5TU 5TU PPD 1, 2TU

가 가 ($P<0.05$).

3) 가 10 mm ITU

2TU 31 6 (19.4%), 2TU 31 9

가 (29%), 5TU 30 16 (53.3%)

1TU 2TU 가 5TU
 PPD 1, 2TU (P<
 0.05). 가 5 mm
 5TU 가
 . BCG ITU 13.81±4.48 ,
 2TU 13.06±4.18 , 5TU 13.07±3.07
 가 .
 : 2TU
 가

- 1) . , 37 . :
 , 1991:12-4.
- 2) , . 6
 . 1991:23.
- 3) , . 7
 . 1995:8-12.
- 4) Grange JM, Gibson J, Osborn TW, Collins CH, Yates MD. What is BCG? *Tubercle* 1983; 64:129-39.
- 5) Pais TF, Silva RA, Smedegaard B, Appelberg R, Anderson P. Analysis of T cell recruited during delayed-type hypersensitivity to PPD versus challenge with tuberculosis infection. *Immunology* 1998;95:69-75.
- 6) Kasinrerk W, Majdic O, Praputpittaya K, Sittisombut N. Enhancement of human lymphocyte proliferative response to purified protein derivative by an anti-interleukin-2 receptor alpha chain antibody(CD 25). *Immunology* 1994;83: 33-7.

- 7) Dunlap NE, Tilden AB. T helper/inducer (CD4+) cells prestimulated with PPD induce monocytes to produce interleukin-1 beta. *J Leukoc Biol* 1991;49:542-7.
- 8) 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.
- 9) Arnadottir T, Rieder HL, Trebucq A, Waaler HT. Guidelines for the conducting tuberculin skin test surveys in high prevalence countries. *Tuber Lung Dis* 1996;77(Suppl 1):1-19.
- 10) . . 7 . :
 , 2001:429-39.
- 11) . RT 23 PPD 2TU
 .
 1998;41:1309.
- 12) , , , . BCG
 .
 1997;40:489-95.
- 13) , , .
 . 1998:
 1-44.
- 14) , , , . 2TU 5TU
 . 2000;
 43:638-43.
- 15) , .
 BCG 2TU
 1999;6:101-6.
- 16) , . BCG
 2TU PPD RT23
 2000;43:14 18-22.