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ORIGINAL ARTICLE

Measurement of tuberculin skin test

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ABSTRACT

Background: Current guidelines suggest that the PPD Mantoux tuberculin test should be read after 48 or 72 hours. We have compared the measurements at these time points.

Materials and methods: A 5-tuberculin unit (TU) PPD Mantoux test was administered to 100 subjects (91% with Bacillus Calmette- Guerin scars). Induration was measured 48 and 72 hours following the injection.

Results: The measurements made at 72nd hour were significantly higher than those made at 48th hour (median: 8.9 vs 4.5mm, p=0.01). In those subjects with indurations at either or both time points (n=74), the readings taken at 72nd hour were on average 2.1mm (95% confidence interval: 0.3-3.1mm) larger than those at 48th hour. Using an induration of >15mm diameter to define a positive result, there were more positive test results at 72nd hour (24) compared to 48th hour (20).

Conclusion: We concluded that, in adults, the size of the 5-TU Mantoux reaction is significantly larger at 72nd hour, thus, in clinical practice, tuberculin tests should be read at this time point since negative tests at 48th hour may be false negative.

Keywords: *Mantoux, Tuberculin test, PPD.*
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INTRODUCTION

Skin testing with tuberculin is most widely used to identify latent tuberculosis infection (1,2). It is used to investigate patients who are suspected of having active tuberculosis but who have not had a culture positive for Mycobacterium tuberculosis (3,4).

It is recommended that tests administered by the Mantoux technique be read at 48 or 72 hours after injection (3,5). However, there is little information comparing readings at 48 and 72 hours. We, therefore, set out to quantify the variability of the tuberculin test caused by the time of reading.

PATIENTS and METHODS

One hundred subjects aged 18-64 years (mean age: 41.8 years) participated in our study. A medical history was obtained from all subjects to ensure that they did not have a medical condition such as HIV, diabetes mellitus, malignancies or taking any medications, or had a history of recent exposure to tuberculosis. Those who developed infections (eg, viral infections) during the study were excluded. Subjects were asked whether they had received a Bacillus Calmette-Guerin (BCG)

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vaccine, and the presence of a BCG scar also was checked.

The Mantoux technique (3) was used to administer 5 U PPD (manufactured by Razi Vaccine and Serum Research Institute, Iran) into the volvar aspect of the forearm of all the subjects. This tuberculin is bioequivalent to 5 tuberculin units PPD (6). Induration was measured in all subjects at both 48th and 72nd hour by a physician with extensive experience in reading tuberculin tests. The margins of induration were defined using the palpation method (3,7) and the results were categorized as positive or negative using a cutoff point of 15 mm for induration diameter. In clinical practice, although reactions of this size may be due to previous BCG vaccinations, they are generally regarded as evidence of tuberculosis infection (3,4).

RESULTS

BCG vaccination scars were present in 91 of the 100 subjects (91%), while 9 subjects (9%) with or without a history of BCG vaccination, had no scar.

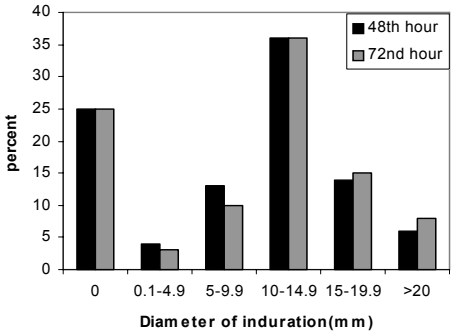

Figure 1. *Comparison of frequency distribution of tuberculin reaction size read at hours 48 and 72*

The median size of induration at 72nd hour was significantly larger than that at 48th hour (8.9 vs 4.5mm respectively, p=0.01). In those subjects with indurations at either or both time points (n=74), the readings at 72nd hour were on average 2.1 mm larger than those made at 48th hour. None of the recorded positive results at 48th hour became negative at 72nd hour.

The results from 12 subjects (12%) increased with the time of measurement. Age did not influence tuberculin reactivity, as the age of subjects with indurations of >15 mm at either time point was not different from those with indurations of <15 mm (mean 39.4 vs 42.8 years, respectively).

Table 1 presents agreement between 48th hour and 72nd hour readings.

Table 1. *Agreement between 48th hour and 72nd hour readings (n=100)*

48th hour reading		72nd hour reading	
		<15mm	≥15mm
<15mm	80	76	4
≥15mm	20	-	20

DISCUSSION

During much of the past 50 years, tuberculin skin test was used for universal screening of the general population and periodic screening of high-risk populations (8,9). In this study, we have shown that the size of the tuberculin reaction may change with the time of reading. Measurements at 72nd hour were on average 2.1 mm larger than those at 48th hour. However, some reactions changed in size by >8 mm because of the time of reading. Using a cutoff point for indurations of 15mm diameter, which is often regarded as evidence of tuberculosis infection (3,4), this variability caused 4% of reactions to be reclassified, with more positive results being recorded at 72nd hour. In Singh et al. study this variability was 8.6% (10). Sokol (11) also noted that some tuberculin reactions do not peak until after 48 hours.

Our study indicates that measurements at 48th hour may underestimate the reaction size (although negative results at 48th hour not became positive at 72nd hour, and positive result not became negative).

The dose of tuberculin (bioequivalent to PPD-S) used in Iran and United States is 5U (3) while in

the United Kingdom and Australia 10U is used (4,12). It has been shown that the higher dose causes reactions that are on average 1.5 mm larger, which results in the reclassification of <1% of tests, using a 15mm cutoff point to define a positive result (12). Therefore, using the lower dose in this study is unlikely to have changed the results.

In summary, the current clinical guidelines for tuberculin testing (3,4,10) have not standardized the time of measurement. Variability due to the time of measurement may lead to a different clinical management strategy. Our study indicates that tests in adults should be read at 72nd hour. Readings at 48th hour may underestimate the reaction size.

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