Correspondence

Fallacies of Mantoux in the Diagnosis of Latent Tuberculosis

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Dear Editor,

Prevention of tuberculosis (TB) disease by treatment of latent tuberculosis infection (LTBI) is a crucial constituent of the National Strategic Plan for Tuberculosis Elimination 2017–2025 in India by 2025.

The Mantoux test dates back to 1890 when it was first demonstrated by Robert Koch. Charles Mantoux, in 1912, first described the intradermal technique as it is used today.1 What is amusing is that even after a hundred years of research, deliberations, and scientific advancements, Mantoux is still the cornerstone of diagnosing LTBI, especially in developing countries like India, despite all its fallacies.

The authors list down seven points as to why should India look beyond Mantoux as a diagnosing test for LTBI and invest in the development of a test which is (importantly) affordable apart from being accurate.

• The standardized dose of Mantoux in India is 5 tuberculin units (TU) (0.1 mL). PPD RT 23 with Tween 80 of strength 1 and 2 TU are standardized tuberculins available, any deviation from these standard tuberculins (many of which are available in the market) leads to an over/underestimation of the size of the induration and hence a faulty interpretation.
• The correct technique of injection produces a pale, discrete elevation of the skin (a wheal) 6–10 mm in diameter at the site of the inoculation.2 In India, this test is almost always administered by laboratory technicians whose style of inoculation of the intradermal injection can vastly influence the results of the test.
• The results are interpreted 48–72 hours after the administration of the test dose, which requires the patient to return back to the laboratory. Here, the onus lies on the follow-up by the patient which is frequently not made.
• The interpretation of the test is dependent on the presence or absence of induration (not erythema) which is determined by palpation (not inspection). For the sake of standardization, the diameter of the induration is measured in millimeters transversely to the long axis of the forearm.3 A failure to read the results in the specified form can lead to an over/underestimation of the size of the induration and hence a faulty interpretation.
• There is no uniformity as far as the size of the induration required for a positive test result is concerned. Different sizes are indicated for different patient populations leading to confusion and fallacies (Table 1).4
• The sensitivity and specificity of this investigation are low which gives rise
to a number of false-positive results, especially in patients infected with nontuberculous mycobacteria and in individuals having a history of a previous Bacillus Calmette–Guérin (BCG) vaccination and false-negative results, especially in individuals who have an inability to mount a delayed hypersensitivity response to intradermal injection of recall antigens, have had a recent (within 8 weeks of exposure) TB infection, had TB infection very long ago, are very young (under 6 months of age), were vaccinated recently with a live-virus vaccine, and have an overwhelming TB disease or an ongoing viral illness.

- The interferon-gamma release assay solves most of the fallacies associated with the use of a Mantoux test but for the moment is limited, especially in developing countries like India by its cost, availability, and lack of infrastructure investments.

**Table 1: Cut-offs for a positive TST for different patient populations**

<table>
<thead>
<tr>
<th>TST reaction</th>
<th>&gt;5 mm</th>
<th>&gt;10 mm</th>
<th>&gt;15 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>People living with HIV</td>
<td>People who have recently (less than 5 years) migrated from countries with a high prevalence of TB</td>
<td>People who do not have any known risk factors for TB</td>
<td></td>
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<tr>
<td>Household contacts of a case of TB</td>
<td>People addicted to the use of injectable drugs</td>
<td></td>
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<tr>
<td>Patients with chest radiographic opacities consistent with old healed infection</td>
<td>People either living in or employed at centers which have a high risk of transmission of TB (e.g., prisons, nursing homes, shelters for the homeless and for the aged, and hospitals)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recipients of organ transplant</td>
<td>Personnel working in laboratories handling mycobacteria</td>
<td></td>
<td></td>
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<tr>
<td>Immunosuppression of any other cause</td>
<td>Children aged less than 4 years or in contact with adults in high-risk categories</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TST, tuberculin skin testing

References