Improved detection of previously undetectable mycobacteria grown in liquid culture

Dear Editor,

An early indicator of mycobacterial liquid culture positivity using MGIT® (Mycobacterial Growth Indicator Tube; BD, Franklin Lakes, NJ, USA) has been reported.¹ This occurs when growth is detected, but the initial identification tests fail to demonstrate presence of mycobacteria or other contaminants. This could be due to insufficient bacterial load in the culture sample, or the consequence of a high concentration of N-acetyl L-cysteine or sodium hydroxide used for processing sputum specimens leading to a false-positive result on the instrument. False-positive rates of 0.5–3.5% have been reported for MGIT.²,³

Guidelines on early positive MGIT culture is described in the World Health Organization (WHO) Mycobacteriology Laboratory Manual.¹ Briefly, the guidance is to re-incubate culture tubes offline for an additional 3–42 days (from the date of the initial positive signal) at 37°C before the identification test is repeated and the results finalised based on these results.¹ Implementation of these guidelines in our laboratory has significantly improved positivity rates. Results are presented here to highlight the impact of this approach in improving the performance of the test.

The results from a total of 9052 consecutive sputum specimens over a period of 1 year (May 2018–April 2019) were analysed. Culture tubes that flagged positive on MGIT were subjected to identification tests as per standard protocol. Tubes that showed either no growth of contaminants or mycobacteria were incubated offline at 37°C for up to 42 days, identification tests were repeated and results finalised based on these results.¹ Implementation of these guidelines in our laboratory has significantly improved positivity rates. Results are presented here to highlight the impact of this approach in improving the performance of the test.

<table>
<thead>
<tr>
<th>Before offline incubation</th>
<th>After offline incubation</th>
<th>Difference</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid results</td>
<td>7401 (81.7)</td>
<td>8000 (88.4)</td>
<td>6.7</td>
</tr>
<tr>
<td>Positive for M. tuberculosis complex</td>
<td>3267 (36.1)</td>
<td>3769 (41.6)</td>
<td>5.5</td>
</tr>
<tr>
<td>Non-tuberculous mycobacteria</td>
<td>587 (6.5)</td>
<td>594 (6.6)</td>
<td>0.1</td>
</tr>
<tr>
<td>Culture-negative</td>
<td>3547 (39.2)</td>
<td>3637 (40.2)</td>
<td>1.0</td>
</tr>
<tr>
<td>Contamination</td>
<td>1041 (11.5)</td>
<td>1052 (11.6)</td>
<td>0.1</td>
</tr>
<tr>
<td>Identification negative</td>
<td>610 (6.7)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Total, n</td>
<td>9052</td>
<td>9052</td>
<td>NA</td>
</tr>
</tbody>
</table>

* Statistically significant.

Table MGIT® identification results finalised before and after offline incubation of tubes at 37°C.

The WHO guidelines for culturing and retesting cultures yielding early positive signals using MGIT™960™ is demonstrated to be effective—growth of organisms that was initially undetectable was now detected. Liquid culture using MGIT960 remains the key tool for the detection of drug resistance in many countries. Loss of samples due to undetectable growth in culture leads to delays in detecting resistance. Implementation of this protocol in the laboratory will not only improve testing performance, but also have a positive impact on patient management.

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Note: MGIT = Mycobacterial Growth Indicator Tube; NA = not available.
Conflicts of interest: none declared.

References

