Comparison of Sensititre MYCOTB MIC plate and the BACTEC MGIT SIRE kit for the detection of isoniazid resistance in *Mycobacterium tuberculosis*

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Introduction and purpose

Multi-Drug Resistant Tuberculosis (MDR-TB) is defined as the association of rifampicin (RIF) and isoniazid (INH) resistance. Compared to RIF resistance which can be accurately detected using molecular assays targeting a 81bp of the *rpoB* gene, INH resistance is caused by a larger number of genetic mutations, and therefore phenotypic testing still remains the gold standard. We compared the analytical performance of the MYCOTB MIC plate (Trek Diagnostic Systems, Cleveland, OH) with the SIRE MGIT antimycobacterial susceptibility testing method (Becton, Dickinson and Co., Sparks, MD).

Methods

We tested 14 *Mycobacterium tuberculosis* complex strains, including the fully susceptible reference strain H37Rv with both MYCOTB MIC plate and MGIT960 SIRE methods. In regard to the latter technique, INH was tested with both 0.1 µg/ml and 0.4 µg/ml concentrations. Sequencing of *katG* and *inhA* genes were performed in parallel.

Results

Among the 14 strains tested, 10 were resistant to INH according to the MGIT SIRE and the MYCOTB MIC plate test. For 12/14 strains, all methods gave concordant results, including for INH level of resistance, which is supposed to be higher when a *katG* is involved. We found one discordant result, for which MGIT SIRE method was susceptible and the MYCOTB MIC plate reported a minimum inhibitory concentration (MIC) >4 µg/ml. For this strain, sequencing did not report a resistance mutation in the *katG* or the *inhA* genes. One strain was found resistant with both phenotypic methods, but was not associated with a *katG* or *inhA* mutation.

MTBc strains	Sequencing results		BACTEC MGIT results		Sensititre MYCOTB MIC (µg/ml)	Concordant?
	inhA gene	*katgG* gene	INH 0,1 µg/ml	INH 0,4 µg/ml		
H37Rv	WT	WT	S	S	< 0,03	Yes
1	WT	WT	S	S	< 0,04	Yes
2	WT	WT	S	S	< 0,05	Yes
3	WT	WT	R	R	1	Yes. High level INH resistance probably due to a mutation located in an unusual location
4	WT	WT	S	S	>4	No. Probably sensititre false resistant or mutation in other genes
5	C-15T mutation	WT	R	S	0,25	Yes
6	WT	S315 mutation	R	R	1	Yes
7	WT	S315 mutation	R	R	1	Yes
8	WT	S315 mutation	R	R	2	Yes
9	WT	S315 mutation	R	R	2	Yes
10	WT	S315 mutation	R	R	2	Yes
11	WT	S315 mutation	R	R	>4	Yes
12	WT	S315 mutation	R	R	1	Yes
13	C-15T mutation	S315 mutation	R	R	>4	Yes

Table1: Final datas for 13/14 strains, with sequencing, MGIT and Sensititre results

Conclusions

We evaluated the Sensititre MYCOTB MIC plate as a potential tool for detecting INH resistance together with other drugs. We found an acceptable correlation with the MGIT SIRE method among the resistant strains, but we nevertheless observed a probable false resistant result linked to the MYCOTB MIC method. Based on these preliminary results, we did not modify our existing workflow procedures in clinical routine. More evaluation is still needed.