Evaluation of the MALDI-TOF System (MALDI Biotyper Microflex LT) in a Microbiology Laboratory at the National Institute for Communicable Diseases (NICD), South Africa

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Abstract:

PURPOSES: The evaluation was intended to determine the promptness and accuracy of identification of organisms in order to establish the feasibility of providing a service to academic centres and regional laboratories within the NHLS, as well as to surveillance and epidemiology units in the event of outbreaks and to confirm the credibility of the National Stock Culture Collection which provides strains to all NHLS laboratories. Reliable, accurate identification of micro-organisms is essential in any clinical or reference laboratory. Conventional methods currently in use, can take up to 48 hours for a final result to be available. Matrix Assisted Laser Desorption /Ionisation-Time of Flight, is a different approach to identification micro organisms. This technique analyses the protein "fingerprint" of organisms by mass spectrometry, eliminating the need for the most basic biochemical tests. The mass spectra obtained are analysed by MALDI Biotyper 2.software and compared to spectra in the dedicated database. The resulting match is given a score value ranging from 0.000 to 1.699 (Not reliable identification) up to 2.300 to 3.000 (highly probable species identification) METHODS: A total of 295 isolates from the culture collection were tested with the MALDI Biotyper. The results were compared with results previously obtained by other biochemical and genetic methods. These isolates comprised a variety of commonly isolated organisms such as Escherichia coli to less commonly isolated such as Legionella species. Among the isolates tested were known ATCC and NCTC reference strains. Most isolates were tested using the direct transfer method. Score values obtained could be improved considerably by using the formic acid extraction method. RESULTS: Of the 295 strains tested, there was overall correlation of 94% (n=277) The most important advantage of the system is the turn-around time of processing samples and releasing final identifications in less than two minutes. Limitations of the system are related to the database which wasn't designed to accommodate all bacterial organisms and development of detailed guidelines for processing mycobacteria. CONCLUSION: The MALDI Biotyper produces an accurate, rapid identification of most clinically significant organisms and with regular database upgrades, will improve the potential to cover a wide range of micro organisms

Key words: MALDI-TOF, Evaluation, NICD