Rapid Identification and Multiple Susceptibility Testing of Pathogens from Positive-Culture Sterile Body Fluids by a Combined MALDI-TOF Mass Spectrometry and Vitek Susceptibility System

Yuaru Tian [1], Bing Zhong[2], Bei Wang[1], Min Li [2]

[1]Department of Laboratory Medicine, Shanghai Medical College, Huashan Hospital, Fudan University, Shanghai, China

[2]Department of Laboratory Medicine, Renji Hospital, Shanghai Jiaotong University School of Medicine, Shanghai, China

Background: Sterile-area infections are associated with high morbidity and sequelae risk. Timely initiation of effective antimicrobial therapy is crucial to improving patient prognosis. However, standard final identification and antimicrobial susceptibility tests (ASTs) are reported 16–48 hours after a positive alert. For a rapid, effective and low-cost diagnosis, we designed this study and evaluated the reliability and accuracy of the program.

Method: We combined matrix-assisted laser desorption/ionization time of flight mass spectrometry with a Vitek AST system, and performed rapid microbial identification (RMI, n = 485) and rapid multiple AST (RMAST, n = 320) on non-duplicated positive body fluid cultures collected from a hospital in Shanghai, China.

Results: Regardless of enrichment, the RMI completed in 40 min per sample and accurately identified Gram negative bacteria (98.9%), Gram positive bacteria (87.2%), fungi (75.7%) and anaerobes (94.7%). Dominant species in multiple cultures and bacteria that failed to grow on the routing plates were correctly identified in 81.2% and 100% of cases, respectively. The category agreements of RMAST results, determined in the presence of various antibiotics, were similarly to previous studies. The RMI/ RMAST results reduced the turnaround time of the patient report by 18–36 hours. The RMI results indicated the patient's antibiotic treatment should be installed (9.28%), ceased (3.71%) and modified (1.86%) in advance. Moreover, the RMAST results provided a variety of accurate MIC values, by which clinicians can choose drug multidirectionally and estimate therapeutic doses precisely. Also, the RMAST results showed 13.44% of the patient's antibiotic treatment should be adjusted because of the bacteria were resistant to last-resort antibiotics (such as vancomycin, linezolid and carbapenem). In contrast, 51.56% of the cases suggested that empirical antibiotic therapy might be de-escalated.

Conclusion: Our study could obtain a accurate, reliable RMI and RMASTs reports, which were useful for optimising a therapeutic regimen.

Comparison of Liquid Chromatography Tandem Mass Spectrometry and Radioimmunoassay Tecniques for Serum Androstenedione Measurement

Kamile Yucel, Sedat Abusoglu, Ali Unlu

Department of Biochemistry, Selcuk University Faculty of Medicine, Konya, Turkey

Background: Quantitative analysis of steroid hormones within clinical laboratories is important for the diagnosis of endocrine-related disorders. Androstenedione is an immediate precursor of estrone and testosterone, and is one of the steroid hormones routinely targeted for quantitative measurement in clinical laboratories The aim of this study was to compare the liquid chromatography and radioiummunoassay results for serum androstenedione measurements.

Methods: For serum androstenedione measurement, 50 µL of internal standard (d5-11 deoxycortisol) was added to 250 µL serum in a glass tubes. Tubes were well mixed for a minute and extracted twice with 3 ml of a solution of ethylacetate twice. After centrifuging at 13500 rpm for 10 minutes, the organic phase was transferred to small glass vials, dried completely under a steam of nitrogen at 40^{0}C. Samples were reconstituted with 200 µL 50% methanol and 40 µL was injected and analyzed by LC-MS/MS. Mass spectrometric analyses were performed using an Shimadzu LC-20-AD (Kyoto, Japan) coupled with a ABSCIEX API 3200 triple quadrupole mass spectrometer (USA) equipped with an electrospray ion source (ESI) operating in positive mode. Passing Bablok analysis was performed with Medcalc v 16.2.1.

Results: Regression equation was found to be as RIA= 0.355509 + 1.216890 LC-MSMS.
Radioimmunoassay gives higher results compared to liquid chromatography tandem mass spectrometry.

Conclusion: LC–MS/MS has some advantages over the use of immunoassays, especially compared with those performed on platforms. LC–MS/MS shows equal or better precision, and these assays do not suffer from interferences due to chromatographic separation and mass spectrometry analysis. According to this study's results, implementing tandem mass technique is of great importance for especially low or high concentrations of serum androstenedione.