New Alternatives for Laboratory Diagnosis of Bloodstream Infection

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Dear Editor: Currently, bacteremia or bloodstream infections (BSIs) are common life-threatening infections with high mortality rates worldwide.[1] In an era of rapidly advancing medical technology, the ability to promptly diagnose BSIs has become critical for effective patient treatment. One promising technology for the accurate and rapid diagnosis of bacterial and fungal infections in the bloodstream is the blood culture identification (BCID) panel, which uses multiplex nested real-time polymerase chain reaction (PCR) to analyze positive blood cultures. This test detects 26 types of bacteria, 7 types of fungi/yeasts, and 10 drug-resistance genes for bacteria, making it the most comprehensive diagnostic test in molecular biology for positive blood cultures. It can comprehensively detect the main pathogens responsible for BSIs.[2]

In the past, blood culture testing could take several days before results were available, and the increasing prevalence of antimicrobial resistance often poses a challenge to patient treatment.[3] However, with modern technology, the BCID panel can provide results in a much shorter time. For example, when comparing the diagnostic turnaround time (TAT) for pathogen identification in positive blood culture samples, the BCID panel showed a TAT of 3.6 hours compared to 28.5 hours for traditional methods. This improved TAT allows physicians to make timely treatment decisions. Moreover, the BCID panel has an advantage of quickly identifying the type of pathogen compared to traditional culture methods. However, data from studies indicate that the use of the BCID panel did not result in patients being discharged from the hospital any sooner. When comparing the group of patients tested with the BCID panel to those who underwent traditional blood culture, the number of days spent in the hospital did not differ significantly.[4] Not only does this rapid diagnostic approach help in identifying infections promptly, but it also aids in reducing the use of unnecessary or inappropriate antibiotics. The ability to detect drug resistance genes along with pathogen identification enables the appropriate and swift administration of antimicrobial therapy, which correlates with higher survival rates in patients with BSIs.[5] This approach also helps address the global problem of antibiotic resistance, a topic has not yet been studied in Thailand.

However, there are limitations to consider. The panel can only detect certain pathogens for which it is designed. If a pathogen growing in the blood culture is not included in the panel's detection range, then a negative result may occur, even though the pathogen is present. This limitation arises because the number of target sites available for detecting different organisms is restricted, and this can result in undetected pathogens if they fall outside of the scope of those specific targets. Additionally, the detection of drug resistant genes does not necessarily imply phenotypic resistance, and interpretation must be done with expertise and caution.[6]

Therefore, the application of molecular diagnostic techniques in BSIs diagnosis has demonstrated outstanding efficacy in identifying pathogens and drug resistance, with accuracy comparable to traditional diagnostic methods. This approach directly impacts

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treatment by enabling quicker interventions. However, due to its high cost, its use may not be feasible with every patient. When considering the implementation of the BCID panel in clinical practice, factors such as cost-effectiveness, the development of staff expertise, and the alignment of clinical guidelines with new technology must be taken into account. These considerations are essential to ensure the optimal use of this technology in a wide range of patients.

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