QuickFISH, developed by AdvanDx, is a molecular diagnostic technique which enables preliminary bacterial identification directly from positive blood cultures. This allows the presumptive identity of the causative organism to be reported at the same time as the Gram film result. QuickFISH uses fluorescent labelled probes to target species-specific RNA sequences in a fluorescent in situ hybridisation assay. Rapid results can be visualised using fluorescent microscopy.

In a recent study carried out at the Royal Alexandra Hospital within NHS Greater Glasgow and Clyde, patient blood culture samples were evaluated for the clinical effectiveness of QuickFISH in the direct detection of Staphylococcus species and Enterobacteriaceae. The reliability of the QuickFISH method in identification of bacterial pathogens was assessed. Its role in the microbiology laboratory setting and potential to provide clinically valuable information in real time was also examined.

Routine bacterial identification from positive blood cultures is a time consuming process. It involves preliminary identification of bacteria, based on the Gram stain of a smear from the positive blood culture, followed by subculture, isolation and identification of the organism. Gram staining alone does not always provide adequate information for appropriate targeted antibiotic therapy. Furthermore, subculture of the positive blood culture sample can delay bacterial identification for 24-48 hours. The need for rapid bacterial identification directly from positive blood cultures is well recognised, since the prompt administration of appropriate antimicrobials in septic patients is associated with reduced mortality.

One hundred positive blood cultures were included in this study. Fifty samples examined microscopically contained Gram positive cocci in clusters (GPCC) which were cultured and identified as Staphylococcus aureus (15), coagulase negative staphylococci [CNS] (25) and non-staphylococcal GPCC (10). The staphylococcal QuickFISH method correctly identified 15/15 positive blood cultures containing S. aureus and 25/25 containing CNS, demonstrating a diagnostic sensitivity of 100%. The QuickFISH test was negative for 10/10 positive blood cultures which contained non-staphylococcal GPCC. No false positive results were obtained; thus the diagnostic specificity was 100%.

The remaining fifty samples used in this study yielded Gram negative bacilli (GNB) which were identified as E. coli (29), K. pneumoniae (9), P. aeruginosa (2) and other GNB (10). Both sensitive and multiple resistant strains of bacteria were identified in this study; four isolates of K. pneumoniae and two isolates of E. coli produced extended spectrum beta-lactamases (ESBL) and one of the P. aeruginosa isolates exhibited carbapenemase impermeability.

The Enterobacteriaceae QuickFISH method correctly identified 28/29 of the positive blood cultures which contained E. coli (97%). No fluorescence was detected in one discrepant sample. In addition, the method correctly detected 9/9 K. pneumoniae (100%), and 2/2 R. aeruginosa (100%). This gave an overall diagnostic sensitivity for the method of 98%. The QuickFISH method also gave negative results for 11/11 of the other GNB (100%). No false positive results were obtained, thus highlighting the 100% diagnostic specificity.

Reliable and Robust Bacterial Species Identification

The Staphylococcus QuickFISH kit was found to have 100% sensitivity and 100% specificity. Similarly the Enterobacteriaceae QuickFISH kit was found to have 98% sensitivity and 100% specificity. This demonstrated that both QuickFISH kits performed well and proved to be reliable and robust methods for direct bacterial identification from positive blood cultures.

A considerable clinical advantage of the Staphylococcus QuickFISH kit was its ability to reliably differentiate between S. aureus and CNS. S. aureus is always considered to be clinically significant when isolated from blood and requires prompt treatment, whereas the majority of CNS isolated are contaminants, introduced when the culture bottles are inoculated. In cases of Gram negative sepsis, the Enterobacteriaceae QuickFISH kit provides invaluable information regarding the identity of the causative organism. This would enable a more targeted approach in the choice of antimicrobial therapy, thus reducing the use of broad spectrum agents and helping to control the spread of antibiotic resistance.

Significantly Decreased Turnaround

In this study, data were collected on the number of hours required to obtain a bacterial identification using the current laboratory protocol for each sample and these were compared to the time taken to obtain a QuickFISH identification. A significant difference in the turn-around time of pathogen identification was found. The average time taken to obtain a bacterial identification using the QuickFISH method was 32 minutes as compared to 27 hours using the current laboratory protocol. QuickFISH, therefore, has the potential to facilitate a marked reduction in the turnaround time required to identify the likely causative organisms in sepsis. This may enable appropriate therapeutic decisions to be made within a clinically relevant time frame.
Easy to Use Method
This research project has evaluated a potentially useful new tool in the laboratory diagnosis and clinical management of patient sepsis. The QuickFISH test proved to be a very simple and straightforward procedure which takes around 30 minutes in total. It is a very easy to use method which incorporates simple instructions with clear images that are simple to follow. Not only would this method provide valuable information regarding bacterial identification, it would also provide Biomedical Scientists with a new laboratory skill of fluorescent in situ hybridization, not currently performed with any diagnostic test.

Timely and Actionable Results
QuickFISH may have the potential to revolutionise the way in which blood cultures are processed and reported within microbiology laboratories. The test has the capability to identify presumptive causative organisms in cases of sepsis, at the same time as the Gram film is interpreted. Such information may be crucial since it will provide timely and actionable results to facilitate specific targeted antimicrobial therapy without delay, which might ultimately result in improved patient outcomes. This makes QuickFISH a desirable diagnostic tool in the investigation of septicaemia.

To find out more about QuickFISH please visit www.sepsis-diagnostics.co.uk or contact marketing@alphalabs.co.uk

When Sepsis Strikes, 2 Days can Mean a Lifetime

QuickFISH™ brings faster sepsis species ID

- Target antimicrobial therapy sooner
- Optimise patient care
- Reduce mortality rates
- Shorten length of stay
- Reduce costs

The QuickFISH rapid molecular diagnostic assays are currently available in the following kits:
- QFSTABC1-50, to distinguish Staphylococcus aureus and coagulase negative staphylococci
- QFENTBC1-25, to distinguish E. faecium from other Enterococci
- QFGNRBC1-25, the Gram-negative Rod QuickFISH assay which differentiates between Escherichia coli, Klebsiella pneumoniae and Pseudomonas aeruginosa
- QFCANBC1-25, that identifies the Candida species C. albicans, C. glabrata and C. parapsilosis

Visit the dedicated website at: www.sepsis-diagnostics.co.uk