Antibiotic susceptibility tests delivered with speed

Increasing levels of antimicrobial resistance globally demand antibiotic susceptibility tests that are easy to use and deliver actionable results quickly. We talk to Dr Marijo Parcina of the University of Bonn, and Dr Jonas Jarvius, CEO and president of **Q-linea**, about how the latter's ASTar technology promises both.

Can you give us an indication of the scale of the problem surrounding microbial resistance around the world?

Dr Marijo Parcina: Antibiotics are widely used in hospitals and medical practices, and make an enormous contribution in reducing loss of life. Growing concern over emerging antibiotic resistance, therefore, is justified. Indeed, it should be considered a global health issue. Bacterial resistance itself is a genetic feature in bacteria, acquired in their evolutionary development long before the arrival of humans. Even so, the exposure of the organisms to antibiotic agents has sped up this previously gradual evolutionary development. In particular, Gram-negative (GN) MDR bacteria – with or without carbapenemases – create challenges in everyday hospital work, and their incidence in epidemiological reports is steadily rising.

What demands exists within the analytical labs for new technologies and methods within antibiotic susceptibility testing (AST) analysis?

MP: AST results deeply inform calculated antibiotic treatment. This is based on the positive identification of the pathogen, which contributes towards the shaping of epidemiological data and natural resistances for the given pathogen. The real calculational therapy should be based on the phenotypical AST, especially for the GN pathogens. New technologies and methods in AST should be able to deliver an accurate minimum inhibitory concentration (MIC) in a shorter time span than other, more conventional techniques. Furthermore, new technologies should, preferably, implicate not just MIC but also additional information over what end-point measurement can provide, such as bacterial morphology and response over time, which could provide deeper insights in some critical bug-drug combinations. Hopefully, the development of more practical tools to divine new combination therapies, giving us actionable proofs through different measurements of in-vitro efficiency of certain antibiotic combinations.

The ASTar system uses true broth dilution to automatically deliver a true MIC-value with speed and accuracy.

A rapid AST result can be delivered one to two days faster than conventional methods. What else do clinicians need to know in order to confidently change an initial empirical antibiotic treatment to more suitable and effective antibiotic(s)?

Dr Jonas Jarvius: Clinicians are faced with two key decisions in this case when confronted with an infection resistant to antibiotic treatment either to increase the dosage of the drug already prescribed, or de-escalate the current treatment. Since all septic patients are placed on broad-spectrum antibiotics, a de-escalation decision is extremely important in reducing the development of antimicrobial resistance in the patient, hospital and, in the long run, society. In order to make actionable decisions for escalation and de-escalation, the diagnostic test needs to support a sufficiently large panel of antibiotics, which is offered by Q-linea's ASTar panel.

ASTar technology uses true broth dilution to deliver a true MIC value and not an estimated MIC value that is also common. We feel that this has been important for the understanding and legitimacy of our chosen strategy, since this is based on the reference technology for AST. Of course, with the difference that ASTar can provide the answer faster and fully automatically. Also, in contrast with established technologies for AST, our image-based technology has the potential to detect other features of susceptibility such as heteroresistance.

What lessons did Q-linea learn from the development of its ASTrID project that were applied to its latest rapid diagnostics instrument, the ASTar?

JJ: ASTrID was developed with the intention of delivering same-day results for patients with sepsis. The ASTrID program itself gave us a much deeper understanding of workflow in the lab and what was currently lacking. It also enabled us to develop state-of-the-art sample preparation technology for complex blood samples. This technology could then be used for the ASTar system and, since it was developed to handle large volumes of complex samples, we think it will enable us to grow the ASTar menu expansion in the future. We also learned that the path to market is more straightforward when clinical guidelines are in place for the upcoming clinical studies, and that it can be beneficial to be second to market if you think your product has competitive advantages over what is currently out there. ●

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