Q-LINEA

Advantages of the ASTar System

Broad antimicrobial panel and true MIC results for early and optimal treatment of bloodstream infections

Current standards of care for patients with bloodstream infections are often limited by delays between blood sampling, blood culture positivity, and antimicrobial susceptibility testing (AST). Without earlier MIC data to guide narrowing of empiric therapy, patients remain at increased risk of mortality. ASTar is a fully automated rapid AST system that delivers true MIC results across a broad antimicrobial panel in approximately six hours, reducing the need for follow-up testing. By boosting workflow efficiency, reducing hands-on labour, delivering AST results faster, and facilitating the earlier start of optimal antimicrobial treatments, ASTar is a major boon for laboratory staff, clinicians, and patients.

Introduction

Effective management of patients with bloodstream infections depends on timely antimicrobial susceptibility testing (AST) and faster therapy optimisation to reduce the risk of disease progression and to help improve patient outcomes. This is particularly important in critically ill and immunocompromised patients, where delays to effective therapy are associated with poorer clinical outcomes. Additionally, rapid AST methods are needed to support antimicrobial stewardship programmes (ASPs) and address rising rates of antimicrobial resistance to ensure the continued success of antimicrobial therapies[1-3].

Under current standard of care, AST results for bloodstream infections are often not reported until at least the second day after blood draw – though laboratory workflows may vary. Because of these potential delays, clinicians are forced to rely on empiric therapy during the initial phase of a patient's treatment. This empiric, and potentially inappropriate, antimicrobial therapy not only drives the development of resistance but may also prolong patient hospitalisation and increase the risk of mortality[4,5].

Rapid AST can support earlier reassessment of empiric therapy and more informed clinical intervention, supporting timely optimization of treatment and reducing antimicrobial exposure, while concurrently reducing hospital and ICU length of stay, thereby contributing to overall savings of healthcare costs[6-8].

ASTar – Rapid AST Results

ASTar is a fully automated system for rapid AST. The ASTar technology is based on broth microdilution (BMD), optimized for shortened time-to-result and conducting phenotypic AST based on continuous two-fold antimicrobial dilutions, delivering true minimum inhibitory concentration (MIC) results and corresponding categorical interpretations (S, I, SDD, R) based on FDA-recognized breakpoints in approximately six hours. This saves approximately 20 hours to treatment optimization when compared to conventional workflows[9].

Automated testing is conducted directly on positive blood cultures without the requirement for any additional culturing steps, significantly reducing the amount of manual labour required and yielding substantial time savings for hospital personnel. Access to true MIC values early in the clinical pathway supports more informed antimicrobial selection and dosing decisions, particularly in severe or high-risk infections.

Controlled Inoculum

Accurate MIC is needed by clinicians in order to determine the correct antimicrobials and antimicrobial dosages to administer to patients. Some automated AST systems rely on a fixed dilution of positive blood cultures as input to the system. However, fixed dilution methods may result in an inconsistent inoculum. This can potentially affect the final MIC values reported and therefore the consequent treatment.

ASTar overcomes this inoculum effect by measuring actual bacterial content during sample preparation and consistently generating final inoculum concentrations that fall within CLSI guidelines. This enables high reliability and repeatability for each sample run, supporting clinical decision-making. Samples can be tested up to 16 hours after signalling positive with retained performance[10].

Figure 1. The ASTar System covers a broad antimicrobial panel and range of dilutions. Packaged in a user-friendly and fully-automated rapid AST platform, the instrument delivers AST reports in ~6 hours.

Table 1. Antimicrobials and antimicrobial dilution ranges for the ASTar BC G– Kit. Reportable range is expressed as ≤ x to > y µg/L.

ASTar BC G–	Reportable range		0.03 0.06 0.125 0.25 0.5 1 2 4 8 16 32 64 128 256 512	Dilutions
Non-fastidious	(µg/L)			
Amikacin (*A. baumannii* complex)	≤2	≥256		8
Amikacin (Enterobacterales)	≤0.5	≥256[1]		10
Ampicillin	≤1	≥128		8
Ampicillin-sulbactam (*A. baumannii* complex)	≤1	≥128		8
Ampicillin-sulbactam (Enterobacterales)	≤1	≥128[2]		8
Aztreonam (Enterobacterales)	≤0.25	≥128[3]		10
Aztreonam (*P. aeruginosa*)	≤0.5	≥128		9
Cefazolin	≤0.25[4]	≥32		8
Cefepime (Enterobacterales)	≤0.25	≥128		10
Cefepime (*P. aeruginosa*)	≤0.25	≥128		10
Cefotaxime	≤0.25	≥16		7
Cefoxitin	≤1	≥128		8
Ceftazidime (*A. baumannii* complex)	≤0.5	≥128		9
Ceftazidime (Enterobacterales)	≤0.25	≥128[5]		10
Ceftazidime-avibactam (Enterobacterales)	≤0.125	≥64[6]		10
Ceftazidime-avibactam (*P. aeruginosa*)	≤0.125	≥64		10
Ceftolozane-tazobactam (Enterobacterales)	≤0.25	≥64		9
Ceftolozane-tazobactam (*P. aeruginosa*)	≤0.25	≥64		9
Ceftriaxone	≤0.25	≥16		7
Cefuroxime	≤1	≥128		8
Ciprofloxacin (Enterobacterales)	≤0.125	≥16		8
Ciprofloxacin (*P. aeruginosa*)	≤0.125	≥16		8
Ertapenem	≤0.06	≥16		9
Gentamicin	≤0.25	≥64		9
Levofloxacin (Enterobacterales)	≤0.125	≥32		9
Levofloxacin (*P. aeruginosa*)	≤0.125	≥32		9
Meropenem (*A. baumannii* complex)	≤0.06	≥128		12
Meropenem (Enterobacterales)	≤0.06	≥128[7]		12
Meropenem (*P. aeruginosa*)	≤0.06	≥128		12
Meropenem-vaborbactam	≤0.25	≥64[8]		9
Piperacillin-tazobactam (*A. baumannii* complex)	≤1	≥512		10
Piperacillin-tazobactam (Enterobacterales)	≤0.25	≥512[9]		12
Tigecycline	≤0.03	≥32		11
Tobramycin (Enterobacterales)	≤0.06	≥64[10]		11
Tobramycin (*P. aeruginosa*)	≤0.125	≥64		10
Trimethoprim-sulfamethoxazole	≤0.06	≥16[11]		9

[1] AST Reportable range for Amikacin is ≤2 to ≥256 µg/mL for *C. koseri*, *E. coli*, *M. morganii* and *P. vulgaris*.
[2] AST Reportable range for Ampicillin-sulbactam is ≤2 to ≥128 µg/mL for *P. vulgaris*.
[3] AST Reportable range for Aztreonam is ≤0.5 to ≥128 µg/mL for *C. freundii* complex, *E. coli* and *M. morganii*.
[4] Interpretive category results for Cefepime/Enterobacterales are susceptible-dose dependent (SDD).
[5] AST Reportable range for Ceftazidime is ≤0.5 to ≥128 µg/mL for *C. freundii* complex, *C. koseri*, *K. aerogenes* and *M. morganii*.
[6] AST Reportable range for Ceftazidime-avibactam is ≤1 to ≥64 µg/mL for *E. coli*, *K. aerogenes*, *K. pneumoniae* group, *M. morganii* and *P. vulgaris*.
[7] AST Reportable range for Meropenem is ≤0.125 to ≥64 µg/mL for *E. cloacae* complex, *K. aerogenes*, *K. oxytoca*, *K. pneumoniae* group and *M. morganii*.
[8] AST Reportable range for Meropenem-vaborbactam is ≤0.5 to ≥64 µg/mL for *M. morganii* and *P. vulgaris*.
[9] AST Reportable range for Piperacillin-tazobactam is ≤1 to ≥512 µg/mL for *C. freundii* complex, *E. coli*, *K. aerogenes*, *K. pneumoniae* group and *M. morganii*.
[10] AST Reportable range for Tobramycin is ≤0.125 to ≥64 µg/mL for *K. aerogenes*, *K. oxytoca*, *K. pneumoniae* group and *P. vulgaris*.
[11] AST Reportable range for Trimethoprim-sulfamethoxazole is ≤0.25 to ≥16 µg/mL for *C. freundii* complex, *C. koseri* and *M. morganii*.

The AST Disc

The ASTar Disc contains over 330 culturing chambers, including antimicrobial chambers across multiple concentration ranges, growth controls, and chambers for determining bacterial concentration for inoculum preparation. The antimicrobial panel supports both fastidious and non-fastidious pathogens, allowing testing to begin prior to the input of species ID, which is only required for final report generation.

Figure 3. Optimized therapy in one run. The extensive antimicrobial susceptibility testing capabilities of the AST Disc deliver clinically actionable results in a single run.

Broad Antimicrobial Panel and Adaptable Disc Space

There is a distinct need for comprehensive antimicrobial and dilution coverage in AST. The ASTar BC G- Kit includes 23 antimicrobials, each tested across 7—12 two-fold dilutions, providing broad MIC coverage. In total, the kit supports testing of 13 species across 215 bug/drug combinations. This broad coverage gives clinicians the confidence to act sooner on evidence-based AST reports, minimizing therapy uncertainty with the broadest rapid AST panel on the market. The Disc design allows future expansion with additional antimicrobials without removing existing ones and accommodates MIC values ranging from very low to very high. All dilutions are measured simultaneously at each time point, eliminating extrapolated values and instead reporting true MICs. This comprehensive, MIC-driven approach supports optimal dosing decisions and increases the likelihood that clinically relevant treatment options are available in the initial AST report, minimizing delays from follow-up testing.

Conclusion

AST is initiated directly from a positive blood culture, and ASTar can be started independently of pathogen ID, which can be entered before, during, or after the AST run to create the final AST report. This can reduce the total time to optimized antimicrobial treatment by approximately 24 hours in common laboratory workflows (but can save up to 48 hours) compared to conventional methodology.

Full automation reduces hands-on time to just a few minutes and helps improve data quality. The Disc design supports a comprehensive AST panel and simultaneous measurement of a broad range of antimicrobial dilutions for MIC determination.

A single ASTar test provides MIC results with corresponding susceptibility interpretations using FDA-recognized breakpoints and CLSI-derived Expert Rules across a broad set of antimicrobials. This increases the likelihood that clinically relevant treatment options are included in the initial AST report and reduces the need for follow-up testing.

ASTar is a comprehensive AST solution delivering rapid results, high-quality reporting, and clinical flexibility. For clinicians, this enables earlier and more confident optimization of antimicrobial therapy during the most critical phase of patient care.

References

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A system for fast results and improved outcomes

ASTar is a comprehensive rapid AST system that, when strategically integrated into critical points in healthcare, could potentially contribute to improved patient care and reduced hospital costs.

Rapid AST has been shown to:

- **Shorten time to optimal therapy[1]**
- **Aid antimicrobial stewardship[2]**
- **Reduce length of stay[3]**
- **Contribute to cost savings[4]**

Rapid AST systems have demonstrated themselves as cost-effective solutions for the management of patients with bloodstream infections while concurrently enhancing overall quality of care. ASTar can be seamlessly integrated into the diagnostic pipeline and encompasses the core tenets of healthcare policies, regulations, and overarching goals.

References

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Save lifetimes

Q-linea is a world-class leader in developing rapid antimicrobial susceptibility testing (AST) technologies that can be used in the treatment of bloodstream infections and sepsis. Microbiologists and clinicians use our rapid AST system, ASTar®, to accelerate and simplify the time-sensitive workflows faced by them and their patients. We are helping to create sustainable healthcare, now and in the future, and safeguard the effectiveness of antibiotics for generations to come. The ASTar System vastly reduces the time to optimal antimicrobial therapies and ensures that patients receive the correct treatments sooner — when time matters most. The ease of use and power offered by ASTar is unmatched in the field.

Q-linea is comprised of an interdisciplinary team that operates out of state-of-the-art, customised facilities in Sweden, Italy, and the United States of America, with partnerships spanning all corners of the globe.

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Product is US-FDA 510(k) cleared.
D47548 v2 05/2026