



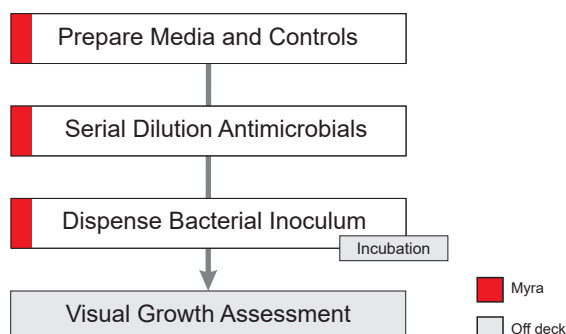
Antimicrobial Susceptibility Testing

What Myra Brings to the AST Lab

Antimicrobial susceptibility testing plays a critical role in microbiology research, clinical diagnostics, and antibiotic development. Broth microdilution assays are widely used to determine the minimum inhibitory concentration (MIC) of antimicrobial compounds, while checkerboard assays enable evaluation of antimicrobial interactions and synergistic drug combinations.

These workflows often require large numbers of precise serial dilutions and repetitive pipetting steps across multiple assay plates. As assay complexity and throughput increase, maintaining consistency and reproducibility between operators can become increasingly challenging.

The Myra Liquid Handling System provides a compact and flexible platform for automating antimicrobial susceptibility workflows, helping laboratories improve reproducibility while reducing repetitive manual pipetting and assay preparation time.



Key Features

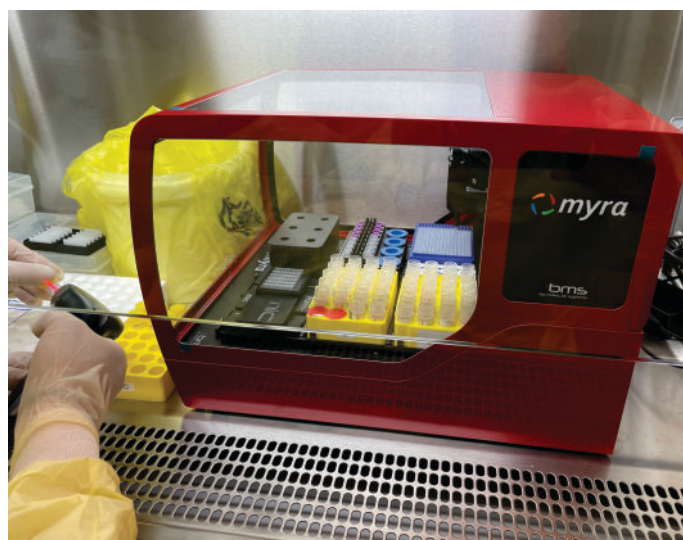
- Automated preparation of 2-fold serial dilutions
- Flexible setup for MIC and checkerboard assays
- Reduced pipetting variability between operators
- Rapid preparation of 96-well assay plates
- Compatible with CLSI and EUCAST workflows
- Supports multiple organisms and antimicrobial compounds
- Minimises repetitive manual pipetting steps

Automated MIC and Checkerboard Assays

MIC broth microdilution and checkerboard assays rely on accurate serial dilutions and consistent inoculum dispensing. While standard MIC assays involve repetitive dilution steps, checkerboard assays are more complex, requiring orthogonal dilution gradients of two antimicrobial compounds across a 96-well plate. Manual preparation can be time consuming and susceptible to pipetting variability, particularly when preparing multiple plates or antimicrobial combinations.

The Myra Liquid Handling System provides a flexible and reproducible solution for automating MIC and checkerboard assay preparation. Myra performs accurate serial dilutions, inoculum dispensing, and checkerboard matrix generation while reducing manual workload and operator variability.

Unlike larger automation systems, Myra offers a compact and intuitive platform that can be rapidly adapted for different organisms, antimicrobial compounds, dilution ranges, and plate layouts. Its small footprint also enables operation within many laminar flow or microbiological safety cabinets, helping reduce contamination risk when working with sensitive or high-containment workflows.



Summary

Myra provides a compact and flexible solution for automating MIC broth microdilution and checkerboard assays, improving reproducibility while reducing repetitive manual pipetting. Myra simplifies preparation of complex antimicrobial susceptibility workflows without the complexity of larger robotic systems.

Case Study: MIC and Checkerboard Assays

Automated preparation of MIC broth microdilution and checkerboard assays using the Myra enabled reproducible serial dilution setup while reducing manual pipetting workload.

Experimental Setup

To demonstrate capability, MIC broth microdilution and checkerboard assays were prepared using the Myra Liquid Handling System. Assays were performed using clinically relevant Gram-negative bacterial isolates, including *Acinetobacter baumannii*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa* strains.

Antimicrobial compounds evaluated included cefiderocol, sulbactam, meropenem, and additional β -lactam or β -lactamase inhibitor combinations.

For MIC testing, antimicrobial compounds were prepared as 2-fold serial dilutions in 96-well flat-bottom plates using cation-adjusted Mueller-Hinton broth (CAMHB), iron-depleted CAMHB (ID-CAMHB) was used for cefiderocol testing. Following preparation of antimicrobial dilution series, bacterial inoculum was dispensed into each well to achieve a final inoculum density of approximately 5×10^5 CFU/mL.

Checkerboard assays were prepared using orthogonal dilution gradients of two antimicrobial compounds across the plate (Figure 1). One compound was serially diluted across rows while the second compound was serially diluted across columns to generate the full antimicrobial interaction matrix.

Plates were incubated at $35 \pm 2^\circ\text{C}$ for approximately 16–20 hours under aerobic conditions before visual assessment of bacterial growth. Clear wells indicated inhibition of bacterial growth, while turbid wells indicated active growth.

All work was conducted by Dr MSR, Center for Applied Biotechnology Studies, Department of Biological Sciences, California State University Fullerton, USA.

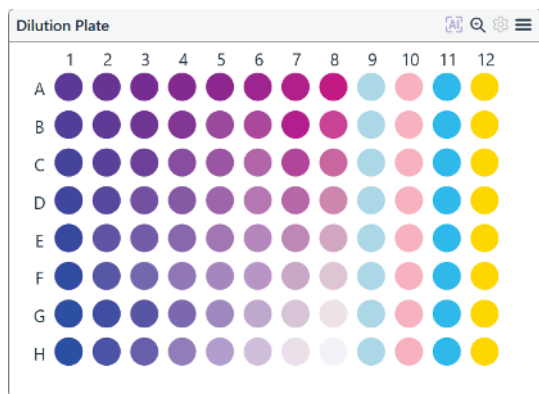


Figure 1. Checkerboard assay setup in Myra (Workbench Software). Columns 1–8 contain orthogonal dilution gradients of sulbactam (light blue) and cefiderocol (pink), with single agent controls in columns 9–10, a growth control in column 11, and a sterility control in column 12.

Results

Myra successfully automated the broth microdilution workflow, generating reproducible serial dilution patterns, clear MIC endpoints, and consistent control results across multiple bacterial strains. Assay preparation was highly consistent across replicate plates, reducing operator variability and enabling straightforward assessment of antimicrobial susceptibility (Figure 2).

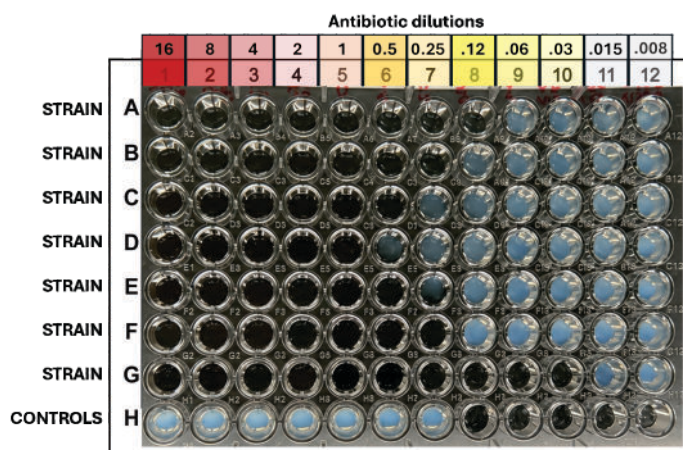


Figure 2. Example broth micro dilution plate prepared using the Myra Liquid Handling System. Clear growth inhibition patterns demonstrate accurate preparation of the antimicrobial serial dilution series.

Myra successfully automated checkerboard assay preparation by generating orthogonal dilution gradients of drug 1 and drug 2, enabling rapid evaluation of antimicrobial interactions across multiple concentration combinations. Clear growth inhibition patterns were observed throughout the concentration matrix, allowing straightforward determination of combination MIC values and identification of synergistic activity against the isolate tested (Figure 3).

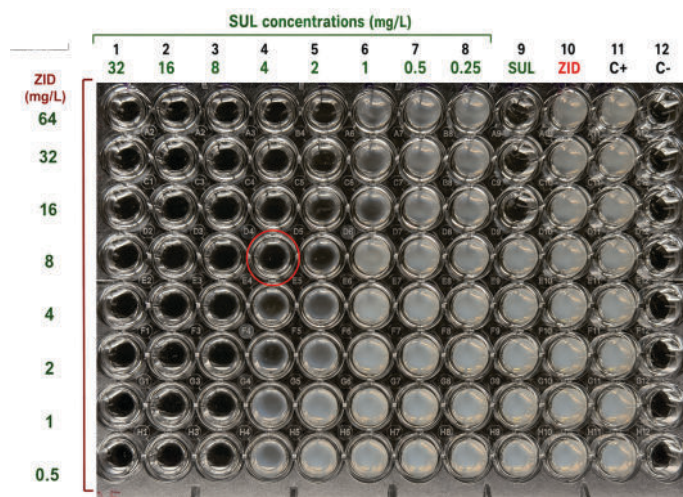


Figure 3. Example checkerboard assay plate prepared using the Myra Liquid Handling System. Orthogonal antimicrobial dilution gradients enable assessment of antimicrobial interactions across the concentration matrix.

Myra provided a simple and reliable solution for automating antimicrobial susceptibility testing workflows. By automating MIC broth micro dilution and checkerboard assay preparation, Myra reduced manual workload while improving reproducibility and assay consistency.