I. Introduction

Rapid diagnostics have been cited by governments and health protection agencies as a key tool to redress the rise of antimicrobial resistance. Here we present a technology that can not only establish the susceptibility of an organism based on its breakpoint in seconds but can also define that organism’s full resistance profile in less than 30 minutes. Slow DST result in:

- Treatment failure
- Antibiotic consumption
- Risk of antimicrobial resistance (AMR)

II. Aims & Objectives

AIM
- To investigate Scattered Light Integrating Collector (SLIC) as a tool for determining drug susceptibility tests.
- To determine how quickly this can be achieved in a clinically relevant manner.

OBJECTIVES
1. Optimise rapid susceptibility screening.
2. Determine if SLIC can determine resistance in less than 30 minutes.

III. Methods

1. HOW DOES SLIC WORK?

SLIC can monitor discrete changes in bacterial cell population possible through the distinct change in light scattering properties.

2. QUICK & SIMPLE SAMPLE PREPARATION

3. KEY STUDY QUESTIONS

IV. Results

1. LIMIT OF DETECTION

2. RAPID DETERMINATION OF DRUG SUSCEPTIBILITY

3. RAPID AST WITH RESISTANT ORGANISMS

Resistant organisms that commonly cause disease were selected and tested against an AST panel of 5 antibiotics at EUCAST designated breakpoints. Each SLIC run consisted of a growth control (media + sample + diluent) & 5 antibiotic doses. The growth curve was used as a reference to determine if the percentage inhibition (%) was consistent with a resistant (<50%) or susceptible response (>50%).

4. MIC testing for Gentamicin

Figure 3 shows the first 10 minutes of an experiment. This data shows that susceptibility can be determined in ≈10 minutes. In cases of resistance the results cannot be read this quickly. This is an important point. Susceptibility is marked by data trending away from the control. When concentrations close to the MIC are used the data may deviate from the control later (≥ 20 minutes). This necessarily extends the experiment. Resistance can only be ascertained after 30 minutes when no deviation has occurred. See figure 6 where the results were not available until after 20 minutes.

Figure 5 presents CRE & ESBL producing Klebsiella shown to be resistant to cefotaxime & cefoxitin with co-amoxiclav (Augusta) exhibiting toxic acidity. Intermediate resistance to trimethoprim and sulfamethoxazole.

V. Discussion & Conclusion

Rapid AST capacity is now more important that ever. Having an affordable device that can give reliable data in less and half an hour is a “game-changing technology.” Unnecessary and inappropriate antibiotic prescriptions are fueling the rise of MDR bacteria worldwide. SLIC offers a highly sensitive method for the detection of antimicrobial resistance in a clinically useful timeframe.