**EXECUTIVE SUMMARY**

**Heteroresistance Antibiotic Resistance Testing**

**TEAM:**
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**FUNDING:**
$222K Emory/Georgia Tech Coulter Translational Fund

**INTELLECTUAL PROPERTY:**
Patents pending (PCT)

Technology available for licensing and partnership

**STATUS:**
Benchtop Testing

**CLINICAL NEED:**
Antibiotic resistance is rising to dangerously high levels in all parts of the world, affecting global health, food security, and development. With the emergence of numerous antimicrobial resistant infections, physicians find it increasingly difficult to treat common infectious diseases. According to the World Health Organization (WHO), a growing list of common infections – such as pneumonia, malaria, tuberculosis, blood poisoning, gonorrhea, and foodborne diseases – are becoming harder, and sometimes impossible, to treat as antibiotics become less effective. The Center of Disease Control (CDC) stated that, in the United States alone, over 2 million patients are affected with antibiotic-resistant infections resulting in costly hospitalizations and 23,000 deaths every year. The patients suffering from infections caused by these drug resistant bacteria often have poorer clinical outcomes and consume more health-care resources than patients infected with nonresistant strains of the same bacteria. Antimicrobial resistant infections cause 700,000 deaths annually across the globe, a number that is projected to increase significantly in the coming years.

The technology is a testing platform that quickly and effectively identifies combinations of antibiotics to treat patients suffering from highly resistant infections.

**TECHNOLOGY:**
Antibiotic susceptibility testing (AST) is the universally accepted method for evaluating antibiotic resistance and is used to aid physicians in choosing the most optimal antibiotic agents for their patients. Due to the lack of the resolution necessary to determine susceptibility and resistance for all bacteria mutations present in a given sample, AST systems classify bacteria as resistant or susceptible when in fact the answer is somewhat in the middle: heteroresistance. Heteroresistance is defined as a subpopulation of a bacteria family showcasing resistance to antibiotics that are effective to the commonly found strain. The lower sensitivity to detect many of these infectious bacteria prevent effective treatment regimens from being designed.

This technology aims to identify the heteroresistant microbes by more precisely analyzing bacterial populations. Once the heteroresistance has been identified, the testing platform will suggest optimal combination(s) of antibiotics to more effectively eradicate the bacterial infection. Implementing this tool would allow a more precise selection of antibiotic combination therapies tailored to a specific patient.

**STATUS:**
To date the team has validated their combination treatment approach *in vitro* and in a rodent model. They have also completed real time *in vitro* testing for a single patient with extremely drug
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resistant *Stenotrophomonas* in which the data guided clinicians in using their combination treatment strategy.

Next steps include validating the technology measuring 400 clinical isolate-drug pairings and comparison tests against the gold standard.

For more information on this technology contact:
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