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Fluorescence Lifetime Imaging Microscopy Device for Antibiotic Susceptibility Testing (FLIM-AST)

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

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BRIEF DESCRIPTION

Antibiotic resistant bacterial infection is a global public health threat leading to prolonged hospital stays, higher medical costs, and increased mortality rates. UCI researchers developed a device to rapidly determine antibiotic susceptibility of bacteria from patient samples to determine more effective antibiotic treatments.

SUGGESTED USES

- To rapidly determine antibiotic susceptibility in bacteria
- To inform effective treatments in patients with bacterial infections
- To evaluate new antibiotic candidates preclinically

FEATURES/BENEFITS

- » Target assessment of antibiotic susceptibility within 2 hours—more rapid than current techniques
- » Uses single-cell microscopy and fluorescence lifetime imaging microscopy
- » Device measures metabolic molecules common to all bacteria
- » Methods for testing do not require bacterial growth

FULL DESCRIPTION

Antibiotics have had a significant impact on society by extending lifespans and treating bacterial infections that could otherwise lead to fatalities of millions of people. However, bacterial strains that are resistant to a large number of antibiotics have rapidly emerged in healthcare settings globally. In healthcare settings, patients are commonly infected by bacteria that are resistant (not susceptible) to antibiotics.

In order for medical care providers to prescribe effective treatments, it is essential to determine whether patients are infected by antibiotic-resistant strains and if so, which antibiotics are effective at treating the infection. Currently, the technology to distinguish between resistant and non-resistant strains requires between 4 to 12 hours and relatively large volumes of blood or patient specimen.

Researchers at UC Irvine developed a device which will rapidly analyze the antibiotic susceptibility of bacteria isolated from patients with bacterial infections. This device is known as fluorescence lifetime imaging microscopy device for antibiotic susceptibility testing, or FLIM-AST. The information delivered by FLIM-AST will enable doctors to determine whether: (1) the current course of antibiotic treatments is effective at eradicating the infection, and (2) there are other antibiotics that could be more effective at treating the infection. The device measures antibiotic susceptibility by measuring bacterial metabolism using single-cell microscopy and fluorescence lifetime imaging microscopy. Use of this device could cut down on the critical wait time towards treatment of bacterial infections and enable personalized medical treatments. In a broader scope, this would improve patient treatment outcomes and decrease the rise of antibiotic resistance.

STATE OF DEVELOPMENT

This device is currently in the development stage. A prototype has been created. The process has been tested on a few laboratory bacterial strains (E. coli and P. aeruginosa) and for a few antibiotics (ampicillin and nalidixic acid). The next steps are to perform benchmarking of the device using a broader range of bacteria and a wide range of antibiotics.

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Reference for National Filings	2021/022066	02/04/2021	2018-528

Patent Pending

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