

04. Diagnostic microbiology

4a. Diagnostic bacteriology (incl. culture based, traditional and general microbiology, serology)

Likely attendance

Onsite

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Background

Epidemiological threats are increasing and causing signs of global crisis. One of them is antimicrobial multiresistance (AMR) which stems from the increased untargeted use of antibiotics. The main problem of phenotypic AMR tests is that after the preparation and inoculation of the test culture takes 24-72 h to read the results. One of the options for the rapid evaluation of bacterial antibiotic susceptibility is a non-contact optical technique called - laser speckle contrast imaging.

Methods

An experiment based on a disk diffusion test was performed by using *S. aureus* and two antibiotics-enriched disks. The experimental setup consists of a 635 nm diode pumped solid state laser (output power 50 mW) spread homogeneously over the petri dish surface and a white light emitting diode to obtain images in white light. Laser speckle images were recorded with an IDS CMOS 10 Mpix camera every 10 seconds. The duration of the experiment was 20 hours and the time between frames was 10 seconds. The Neural network was used to classify between the zones of bacterial activity and the sterile zones formed around discs. The area of experiment was divided into 2 parts: 1) around the first disc and 2) around the second disc. One part was used as a training set. The second - a test set. The arrays of two types of signals were obtained. The signals were divided into time intervals of 1.5 hours in order to obtain a classification result during this short time period.

Results

The decrease in the signals' value occurred in a dynamic manner (7.7 mm-6 h; 8.5 mm-7.3 h; 10.1 mm-9.3 h; 11.3 mm-10.5 h) representing the radius of the sterile zone. Outside the sterile zone, the signal decreased much later and simultaneously for different radii. The

signals in both zones definitely differed from each other. The correct classification reached 85 percent (6.1-7.6 h).

Conclusions

The study shows that image-assisted disc diffusion test would identify antimicrobial susceptibility faster than using the disk diffusion method without laser speckle technology.

Keyword 1

Antimicrobial resistance (AMR)

Keyword 2

Antimicrobial susceptibility testing (AST)

Keyword 3

laser speckle imaging

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Conflicts of interest

Do you have any conflicts of interest to declare?

No