Development of an innovative tool for rapid detection of broad-spectrum β-lactamases: the BL-Detectool

BACKGROUND

Antimicrobial resistance causes 25,000 deaths in the EU per year. The extra costs associated with the treatment of these infections are estimated at 1.5 billion euros, only in Europe. The increase in the number of infections caused by extended-spectrum β-lactamase-producing Enterobacteriaceae (ESBL) and the emergence of carbapenemase-producing Enterobacteriaceae represent an immediate public health threat that requires urgent actions.

THE BL-Detectool

For the first time, a new detection system will allow for a fast detection of β-lactamases in clinical samples. The detection systems corresponds to a strip, which allows the immunological detection, enclosed in a plastic device which carries out sample treatment in a very simple way (filtration, concentration, extraction, incubation) and deposits it onto the strip. The concept of the device and the different steps involved in the test are being evaluated in different media (urine, blood), with different bacteria.

At this stage of the project the devices, produced by 3D printing, are ready to be fit with clinical habits and analytical specifications (specificity, reproducibility and sensitivity). At one point, the procedures and the detection system should be perfectly adapted to the hospital practices.

RESULTS

Using the BL-Detectool, the workflow for identification of multi-drug resistant bacteria is shortened to 30 minutes:

- **Current Workflow**
  - Sample Reception and processing
  - Culture on selective or non selective media
  - MDR bacteria Detection/Characterization
  - Rapid immunocassay
  - Biochemical test
  - PCR
  - MALDI-TOF

  **Time to result between 16h and 30h**

- **Workflow with BL-Detectool**
  - Sample Reception and processing
  - MDR bacteria Detection/Characterization
  - BL-Detectool

  **Time to result 20 to 30 min.**

THE PROJECT

The BL-Detectool development is funded by EIT Health.

Target group

The main market for this product facilities where fast detection with the device can be used for more targeted treatment of patients, and for efficient and cost saving treatments, including:

- Intensive care units
- Surgical units
- Patient admissions unit of hospitals
- Clinical microbiology laboratories
- Nursing homes

The target audience is:

- Clinicians
- Clinical microbiologists
- Hospital managers
- Device users (health professionals)
- All partners globally

Partners of the project:

- Assistance Publique – Hôpitaux de Paris, Paris, France
- Commissariat à l’énergie atomique et aux énergies alternatives (CEA), Gif sur Yvette, France
- Barcelona Institute for Global Health (ISGlobal), Barcelona, Spain
- IESE Business School, Barcelona, Spain
- Semmelweis University, Budapest, Hungary
- University of Barcelona, Barcelona, Spain
- Industrial partner: NG Biotech, Guipry, France

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