

BiofilmChip: The first in vitro diagnostic device to monitor biofilm growth

The Challenge

The recent global increase in the prevalence of **antibiotic multiresistant bacteria** and lack of new antibiotic agents emphasize the **importance of selecting appropriate antimicrobials** for the treatment of infections. Special attention must be paid to those that are due to biofilms, since biofilm bacteria are much more resistant to antibiotic treatment, as well as to the host immune response. **Biofilms cause serious infections and help make infections chronic.** Most of these infections, such as pulmonary exacerbation in patients with cystic fibrosis, are treated by different antibiotics previously selected doing an **antibiogram analysis**. **Despite antibiogram is the current diagnostic method it does not allow the detection of biofilms. Therefore, there is a special need to detect biofilms.**

The Market

Respiratory infections represent a therapeutic challenge, accounting for the cause of mortality in developed countries of more than 4 million people annually. Furthermore, it is estimated that 1-2% western population will suffer a chronic wound infection due to bacterial biofilms. Biofilms cause chronic infections in human tissues at different body sites, e.g., bronchiectasis (Cystic Fibrosis, Chronic Obstructive Pulmonary Disease, chronic wound infections, etc.) or by developing on the surface of medical devices (e.g., orthopedic devices, endotracheal tubes, intravenous and urinary catheters, etc.). Despite intensified antimicrobial therapy, in chronic lung infection, repeated exacerbations, and progressive deterioration in lung function remain a major cause of morbidity and mortality.

The Asset

BiofilmChip will be a breakthrough in the microbiology units of the hospitals. This innovative *in vitro* device is a miniaturized microfluidic platform to evaluate simultaneous biofilm growth of different bacterial species. Importantly, the antibiogram activity of various compounds can be determined in a high-throughput way. A sensor-system based on impedance measurements has been added for easy characterization of biofilm growth and treatment, to be more suitable for a routine microbiological laboratory or basic research laboratory. This new technology allows evaluating simultaneous biofilm growth of different bacterial species, giving more information to improve and redefine final treatment. (Blanco-Cabra, Núria, et al. *npj Biofilms and Microbiomes* 7.1 (2021): 1-9.)

The asset value

BiofilmChip overcomes the limitations of antibiogram, the current diagnostic method, that does not allow the detection of biofilms.

- It's an ***in vitro* diagnostic microfluidic device** that allows the growth and quantification of bacterial biofilms.
- It allows to **determine the best therapeutic intervention** for a specific patient (treatment adjustment to reduce antibiotic multiresistance and patient recurrence).
- **Easy to use** device that allows antimicrobial testing in a **high-throughput analysis**.



Uses

- Provide better diagnostic and personalize treatment for chronic infections
- Miniaturized microfluidic platform allows evaluating simultaneous biofilm growth of different bacterial species
- Testing of new antibiotics targeting bacterial biofilm
- Research tool device for Biofilm research studies.

Scientific Project Leader

Dr. Eduard Torrents

<https://ibecbarcelona.eu/bactinf>

Stage of development

Successfully done:

- ✓ Sensor characterization for biofilm measurements
- ✓ Prototype and analytical validation
- ✓ Reproducibility, stability and uniformity tested.
- ✓ Comparison with standard confocal microscopy evaluation was done to test the robustness

Intellectual Property Status

PCT/EP2019/058570, April 2019

Exploitation plan

Interesting for companies with drug discovery programs of new antibiotics targeting biofilm infections.

Interesting for companies with in vitro diagnostic technologies for antimicrobial susceptibility testing.

Product available for licensing with technical cooperation

Contact

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