

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

Challenge

The prevalence of antibiotic multiresistant bacteria is increasing globally, and the lack of new antibiotic agents emphasise the importance of selecting appropriate antimicrobials for the treatment of infections. Special attention must be paid to biofilm forming infections, since biofilm bacteria are much more resistant to antibiotic treatment, as well as to the host immune response.

Biofilms cause serious infections and help chronify **infections**. Most of these infections are treated by different antibiotics, selected by an antibiogram analysis, the current diagnostic method. However, it does not allow the detection of biofilms, and therefore, there is a special need to detect biofilms.

Market

Only respiratory infections account for the cause of mortality of **4 million people** in developed countries 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 different human tissues e.g., bronchiectasis (Cystic Fibrosis, Chronic Obstructive Pulmonary Disease, chronic wound infections, etc.) and develop also 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.

Asset

BiofilmChip will be a breakthrough in the microbiology units of the hospitals. This innovative in vitro device is a miniaturised microfluidic platform to evaluate biofilm growth of multiple bacterial species. Importantly, the antibiofilm activity of various compounds can be determined in a high-throughput way. A sensor-system based on impedance measurements has been added for easy characterisation 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.)

Asset Value

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

- ❖ It is an in vitro diagnostic microfluidic device that allows the growth and quantification of bacterial biofilms
- ❖ It allows to personalise the treatment for a specific patient to be more effective and efficient
- ❖ It will reduce antibiotic multi-resistance and patient recurrence
- ❖ Easy to use device that allows antimicrobial testing in a high-throughput analysis



Uses

- ❖ Provide better diagnostic and personalised treatment for chronic infections
- ❖ Miniaturised microfluidic platform for evaluating biofilm growth of multiple bacterial species
- ❖ Testing of new antibiotics targeting bacterial biofilm.
- ❖ Research tool device for Biofilm research studies

Team

Eduard Torrents - Scientific Leader
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Eduardo Salas - Head of Tech Transfer

Stage of Development

Successfully done:

- Sensor characterisation 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

IP strategy under development

Exploitation Plan

Product available for licensing with technical cooperation. Potential interested parties:

- Drug discovery programs of new antibiotics targeting biofilms
- *In vitro* diagnostic technologies for antimicrobial susceptibility testing
- Hospitals for improving diagnostics and personalise treatments

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