

# BiofilmChip:

## The first in vitro diagnostic device to monitor biofilm growth

BiofilmChip allow the growth and quantification of bacterial biofilms to **determine the best therapeutic intervention** for a specific patient (treatment adjustment to reduce antibiotic multiresistance and patient recurrence).

### 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 Technical Solution

**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.

### The Market & Potential Applications

**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.

### Innovative Advantages

BiofilmChip overcomes the limitations of antibiogram, the current diagnostic method, that no 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**.

Provide better diagnostic and personalize treatment for chronic infections



Miniaturized microfluidic platform allows evaluating simultaneous biofilm growth of different bacterial species



### Scientific Project Leader

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### 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

Studies ongoing:

- ✓ Preliminary clinical validation (Bronchiectasis Samples)

### Intellectual Property Status

PCT/EP2019/058570, April 2019

### Business opportunity

A way to access to **new market for companies devoted to IVD for antimicrobial testing**. To sell in vitro diagnostics to hospital and diagnostic companies to test anti-biofilm susceptibility. Also could be manufactured as research tool device.

**Patent available for licensing** with technical cooperation.

### Keywords

Biofilm, antibiogram, diagnostic, chronic infectious, bronchiectasis, cystic fibrosis, research tool.

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