BioFilm Control
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Breaking through the matrix of antibiotic resistance

Biofilms are a major contributor to the global challenge of antibiotic resistance. BioFilm Control is leading the way in eradicating the biofilm barrier and overcoming antibiotic resistance with compounds that have blockbuster potential.

Bacteria have a remarkable ability to switch between different modes of living. In favorable conditions of temperature and food, they grow, living a solitary, planktonic lifestyle, existing as free-floating individuals. This mode is at the origin of the usual acute infections where bacteria are sensitive to usual antibiotics. Under other, less favorable conditions, they adopt a social lifestyle, in which they group together with millions of other individuals to form bacterial communities called biofilms, bound together by a viscous, polymeric extracellular matrix.

Biofilms are ubiquitous and can form on many surfaces relevant to human health: on our teeth, in the form of plaque; on implanted medical devices, such as catheters and pacemakers; and as infections in organs such as the skin, heart and lungs. Biofilms are common, occurring in 80% of chronic human infections.

Once formed, biofilms physically protect bacteria, shielding them from attack by immune cells and antibiotics. This allows acute infections to become established as chronic infections that are resistant to treatment. As a result, biofilms are a major contributor to the global health challenge posed by bacterial infections.

Blocking biofilms

BioFilm Control, headquartered in Saint-Beauzire, France, is tackling this challenge head on with new technologies to characterize biofilms and identify the antibiotics most likely to be active against them, while pioneering the development of novel compounds that can block the switch to biofilm mode, where bacteria become resistant and trigger chronic infections.

BioFilm control has developed a technology platform, the BioFilm Ring Test, which was initially created to assess the propensity for bacterial species to form biofilms and characterize their growth dynamics. BioFilm Control's Ring Tests, which are more and more widely used in laboratories around the world, have since been adapted to identify antibiotics effective against biofilm-forming bacteria.

Antimicrobial Susceptibility Tests (ASTs), known as antibiograms, are widely available but existing tests only look at bacteria in their solitary, planktonic form. BioFilm's Ring Test has been adapted to create a Biofilm Susceptibility Test (BST), the Antibiofilmogram Test, which provides a simple visual readout showing whether a given antibiotic prevents a bacterial species or strain forming a biofilm. These results can then be used to guide the prescription of antibiotics that will reduce the risk of chronic infection (Fig. 1).

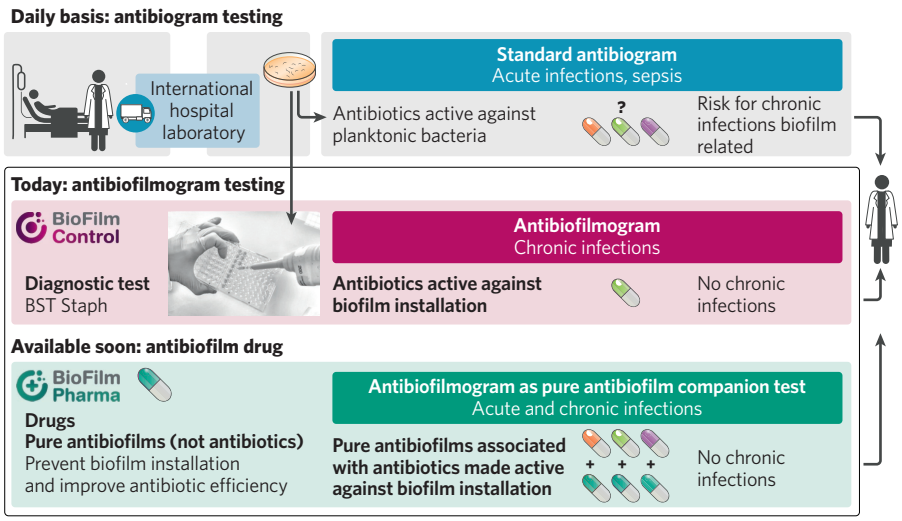

Fig. 1 | BioFilm Control's antibiofilm tests and drugs in development to erase antimicrobial resistance. BST, BioFilm susceptibility test.

At the end of 2020, BioFilm Control announced the CE marking and launch of Antibiofilmogram BST Staph to guide antibiotic use in the treatment of foot ulcers infected with *Staphylococcus aureus*, a major complication of diabetes. Diabetic foot ulcers occur in about 15% of diabetes patients, significantly reduce quality of life, and, if they do not respond to therapy, they often require lower-leg amputation.

BioFilm Control is currently developing Antibiofilmogram BSTs for other wound indications (surgical site infections, burns), as well as for respiratory infections (cystic fibrosis and pneumonia acquired from assisted ventilation). BSTs will help clinicians select from current antibiotics those that will be most effective in treating these patients.

In addition to being a key partner in determining the best treatment for potentially chronic infections, BioFilm Control's technologies also contribute to improved antibiotic stewardship by creating a virtuous circle in which chronic infections are reduced, fewer people end up in hospitals and the use of antibiotics is reduced. Together, these benefits should deprive bacteria the opportunity to evolve new antibiotic resistance mechanisms and, over time, reduce the burden of multidrug-resistant bacteria.

Next steps for Biofilm

Looking to the future, this circle will be made even more virtuous through BioFilm Pharma, a sister company, currently developing the world's first pure antibiofilm compound able to block the switch to biofilm mode and make the bacteria more vulnerable to antibiotics. To date, ten candidate molecules have been identified, and two have been selected as leads. One has a narrow activity spectrum and is only effective against biofilms from *Staphylococcus*. spp., and the other is a broad-spectrum molecule active against biofilms from the highly virulent and resistant ESKAPE species (*Enterococcus faecium*, *S aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter* spp.).

These pure antibiofilm molecules will be used in conjunction with antibiotics identified by the Antibiofilmogram companion test. As first-in-class compounds with applications in the overwhelming majority of human infections, BioFilm's antibiofilm compounds, which are expected to reach clinical development by 2028, have blockbuster potential. BioFilm Control welcomes discussions with potential investors and partners who want to join the mission to break down the barriers to antibiotic resistance.

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