Bacterial Biofilm Infections: Personalizing Patient Treatment

Research scientists and physicians aim to use real-time cell analysis instruments to quickly characterize, ex vivo, the antibiotic susceptibility of bacterial biofilm infections prior to treating patients

San Diego, CA (PRWEB) May 23, 2017 -- Bacterial biofilms, surface adherent communities of bacteria that are encased in a secreted extracellular matrix of polymeric molecules, can cause diverse pathologies ranging from food poisoning and catheter infections to gum disease and the rejection of medical implants. Though the economic impact of biofilms is in the tens of billions of dollars per year, there is currently a paucity of means for preventing their formation or treating them once they are established. Compared to the free-floating “planktonic” lifestyle, within biofilms bacteria adopt differential gene expression profiles, have heightened resistance to antibiotics (up to 1,000-fold), and are less detectable/ accessible to the immune system. The current approach for treating biofilm infections is far from optimal: antibiotics are administered in a trial-and-error manner.

To reduce the time required for eliminating a biofilm infection, lower the cost of treatment, and improve the patient’s experience, it would be helpful to empirically identify the most efficacious antibiotic prior to initiating treatment. Towards this end, Dr. Alex Mira and colleagues at the Centre for Advanced Research in Public Health (Valencia, Spain) recently announced an initiative to personalize the treatment of biofilm infections using a novel ex vivo antibiotic screening assay. In their protocol, bacteria from biofilm growing on a patient’s catheter, medical implant, infected gums, etc. are isolated and grown in specialized electronic microtiter plates (E-Plates®) in the presence or absence of diverse antibiotics. An xCELLigence instrument, which uses the principle of cellular impedance to track the real-time growth of both the bacteria and their extracellular matrix inside E-Plates, is then used to rank order the efficacy of the different antibiotics tested. Using this approach, in just 8 hours a physician can identify the optimal therapeutic course of action on a patient by patient basis.

The primary objective of this initiative’s ongoing first phase is to determine how accurate the ex vivo xCELLigence assay is for predicting antibiotic efficacy in patients. With the backing of Minister of Health Carmen Montón, the project has been fast-tracked and Mira’s team is expecting to enroll 100 patients over the first year. If the clinical findings reflect the preliminary data, this personalized approach will revolutionize how biofilm infections are treated in the near future.

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