How to do a rapid screening of antibiotics using nanoporous membranes

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Antimicrobial resistance (AMR) is a global healthcare challenge causing close to a million of deaths worldwide per year, and the situation is expected to worsen greatly in the coming years, being estimated to become leading cause of death by 2050 [1].

Current efforts to reverse this scenario are focused on the selection of suitable treatments for antimicrobial resistant organisms and the identification of new antibiotics. The finding of less aggressive antibiotics with antivirulence activity, just able to inactivate the bacteria by inhibiting the secretion of virulence factors is of key relevance to minimize the AMR. Unfortunately, current methods for antibiotic screening have important limitations to accomplish these objectives, since do not allow the identification of antivirulence activity [2].

In this context, in this talk novel bioanalytical platforms based on nanoporous membranes for the rapid antibiotic screening, giving accurate information about the antivirulence activity of the compound will be presented [3]. The detection of virulence factors in bacteria cultures is proposed for this purpose. The evaluation of the inhibition of the secretion of virulence factors (i.e. hyaluronidase for gram-positive bacteria) upon incubation with the antibiotic allows to identify such activity. Moreover, this kind of systems give quantitative information about the dose-response in terms of levels of secretion of the virulence factors, which would be potentially helpful for a better understanding of the mechanisms affecting the quorum sensing system (cell-to-cell communication in bacteria). The particular case of chronic wound infections, estimated to affect 1-2% of the worldwide population, is selected as target.

The set-up used for the bacteria culture, antibiotic incubation and electrochemical detection will be shown for teaching purposes.

References

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[3] A. de la Escosura-Muñiz et al. *ACS Appl. Mater. Interf*. 11 (2019) 13140.

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