04. Diagnostic bacteriology & general microbiology

4d. Molecular diagnostics (incl POCT and syndromic testing)

Javier Ramon-Azcon [1, 2], Carme Pastells [1, 3], Francisco Sanchez-Baeza [1, 4], M.-Pilar Marco [1, 4]

[1]Nanobiotechnology for Diagnostics (Nb4D), Department of Surfactants and Nanobiotechnology, Institute for Advanced Chemistry of Catalonia (IQAC) CSIC - Barcelona (Spain), [2]Actual affiliation: IBEC, c. Baldiri Reixac 15-21, 08028 Barcelona - Barcelona (Spain), [3]Actual affiliation:Pragmatic Diagnostics, Mòdul de Recerca B · Parc de Recerca UAB · 08193 Bellaterra - Bellaterra (Cerdanyola del Vallès) (Spain), [4]Networking Research Center on Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN), Spain - Madrid (Spain)

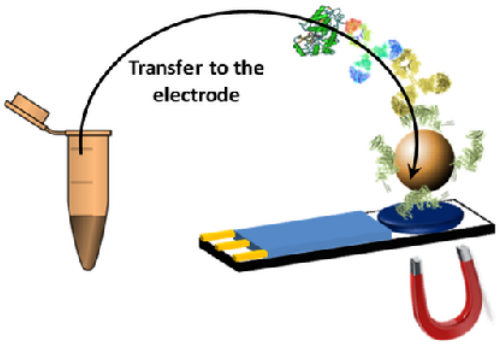
Background Pseudomonas aeruginosa is a life-threatening and highly virulent pathogen frequently isolated in intensive care units (ICU) and in a variety of diseases or injuries. Current diagnostic methods based on classic cell culture enrichment followed by identification by biochemical means are time consuming and the detectability achieved is often not sufficient unless long enrichment periods are employed. There is a clear need of new strategies to enable faster diagnosis and disease monitoring. Point-of-care (PoC) testing suited to perform analysis close to the patient are gaining acceptance within the clinical field. Recently, we have pointed at the potential of pyocyanin (PYO) as biomarker of P. aeruginosa infections and in this communication, we present a PoC device for its use on diagnostic.

Methods Magnetic beads were biofunctionalized with immunoreagents produced against PYO. The PoC device was developed using screen-printed carbon electrodes (SPCEs) provided of a magnet placed below to capture the immunocomplexes formed on top of the magnetic beads after a short incubation period. The product produced as result of the action of the enzyme labelled antibodies is detected amperometrically employing a fixed potential of 0.1 V. The PoC device has been used to analyze sputa and bronchoalveolar aspirates (BAS), previously spiked with PYO

Results A PoC diagnostic device developed is able to reach a LOD of 0.22 ± 0.05 nM of PYO, much below the reported concentration values found in sputa obtained from infected patients (up to 100 µM). Results could be obtained in less than 30 min from sputum or BAS samples after a very simple sample treatment. The device has been found to provide reproducible and accurate results in clinical samples.

Conclusions P. aeruginosa infections could be easily detected with a PoC by using the device here presented. Accurate and quantitative results regarding PYO presence in clinical samples can be recorded in a short time and using a very simple protocol. This device could provide information on the infection at an early stage of the disease.

PYO PoC scheme to detect P. aeruginosa infections



Keyword 1
Pseudomonas aeruginosa
Keyword 2
PoC
Keyword 3
Immunosensor

Conflicts of interest