**Electrochemical sensors – a useful tool for the detection of Pseudomonas aeruginosa**

Bogdan Feier, Alexandra Canciu, Denisa Capatina, Teodora Lupoi, Mihaela Tertis, Cecilia Cristea

*1Iuliu Haţieganu University of Medicine and Pharmacy, Faculty of Pharmacy, Department of Analytical Chemistry, 4 Pasteur Street, 400021 Cluj-Napoca, Romania*

*ccristea@umfcluj.ro*

*Pseudomonas aeruginosa* is one of the most opportunistic Gram-negative bacteria, capable to develop antimicrobial resistance and biofilm, leading to severe healthcare-associated infections (HAI), associated with high rates of morbidity and mortality. Pyoverdine (PyoV), a siderophore, small, pathogen-derived molecules utilized in iron acquisition and pyocianin (PyoC), a zwitterion at blood pH, able to cross the cell membrane, are important virulence factors for *P. aeruginosa*. To produce the biofilm and the virulence factors, the *P. aeruginosa* bacteria communicate with each other through a communication system called quorum sensing (QS), using hormone-like substances called autoinducers (AI), like N-3-oxo-dodecanoyl-homoserine lactone (3-O-C12-HSL) and Pseudomonas quinolone signal (PQS) [1]. The detection of these molecules with highly sensitive and selective electrochemical sensors can facilitate the rapid identification of HAI.

Our preliminary studies showed that PyoV and PyoC could be electrochemically oxidized on graphite-based screen-printed electrodes with a limit of detection in nM range [2]. A glove-embedded printable sensor, used for electrochemically detection of PyoV and PyoC was developed. The glove contains two sensors printed along the length of the index and middle fingers. Once placed on the hand of a subject during an investigation session, the glove-based sensors platform can be applied for fast detection of PyoC and PyoV on different surfaces. The sensors featured linearity over 0.01-0.1 µM range and 5-50 μM range, with a sensitivity of 2.51 µA µM-1 and 1.09 nA μM-1 for PyoC and PyoV, respectively. The main application of the proposed finger-based sensors was the analysis of furniture, medical scrapper, and sink contaminated areas for the presence of the PyoV and PyoC [3]. Furthermore, a new electrochemical stick-type test for the detection of PyoC as *P. aeruginosa* virulence factor from tap and wastewater will be described.

In another approach, QS molecules were detected using electrochemical sensors. The development of the first electrochemical aptasensor based on carbon-based screen-printed electrode modified with gold nanoparticles for the detection of 3-O-C12-HSL will be presented. Each step in the fabrication of the aptasensor (gold nanoparticles deposition, aptamer immobilization, incubation with the analyte) was optimized and characterized using cyclic voltammetry, differential pulse voltammetry, and electrochemical impedance spectroscopy. The binding affinity of 106.7 nM for the immobilized thiol-terminated aptamer was determined using surface plasmon resonance. The aptasensor exhibited a logarithmic range from 0.5 to 30 µM, with a limit of detection of 145 ng mL−1. The aptasensor was successfully applied to real samples analysis (spiked urine samples, spiked microbiological growth media, and microbiological cultures)[4]. The electrochemical fingerprint of PQS was determined using screen-printed electrodes modified with different nanomaterials. The optimal conditions in terms of electrolyte, pH and electrochemical technique were determined. The method was successfully applied to PQS detection from real samples.

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