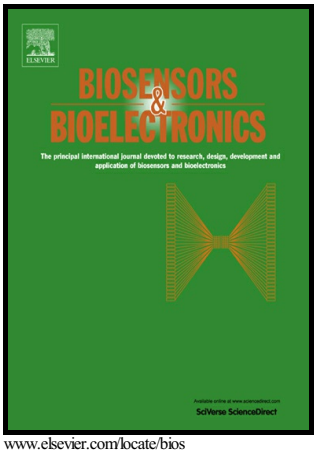

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Electrochemical Sensors for Identifying Pyocyanin Production in Clinical *Pseudomonas aeruginosa* Isolates

Hunter J. Sismaet[1], Ameet J. Pinto[2], Edgar D. Goluch[1,3]*

[1]Department of Chemical Engineering, Northeastern University, Boston, MA
[2]Department of Civil & Environmental Engineering, Northeastern University, Boston, MA
[3]Department of Biology, Northeastern University, Boston, MA

*To whom correspondence should be addressed: e.goluch@northeastern.edu

Abstract:
In clinical practice, delays in obtaining culture results impact patient care and the ability to tailor antibiotic therapy. Despite the advancement of rapid molecular diagnostics, the use of plate cultures inoculated from swab samples continues to be the standard practice in clinical care. Because the inoculation culture process can take between 24 and 48 hours before a positive identification test can be run, there is an unmet need to develop rapid throughput methods for bacterial identification. Previous work has shown that pyocyanin can be used as a rapid, redox-active biomarker for identifying *Pseudomonas aeruginosa* in clinical infections. However, further validation is needed to confirm pyocyanin production occurs in all clinical strains of *P. aeruginosa*. Here, we validate this electrochemical detection strategy using clinical isolates obtained from patients with hospital-acquired infections or with cystic fibrosis. Square-wave voltammetric scans of 94 different clinical *P. aeruginosa* isolates were taken to measure the concentration of pyocyanin. The results showed that all isolates produced measureable concentrations of pyocyanin with production rates correlated with patient symptoms and comorbidity. Further bioinformatics analysis confirmed that 1649 genetically sequenced strains (99.9%) of *P. aeruginosa* possess the two genes (PhzM and PhzS) necessary to produce pyocyanin, supporting the specificity of this biomarker. Confirming the production of pyocyanin by all clinically-relevant strains of *P. aeruginosa* is a significant step towards validating this strategy for rapid, point-of-care diagnostics.

Keywords: diagnostic, electrochemistry, *Pseudomonas aeruginosa*, pyocyanin