ENTWICKLUNG EINES ELEKTROCHEMISCHEN SENSORS ZUR SCHNELLEN ERKENNUNG VON PSEUDOMONAS AERUGINOSA IN KRANKENHÄUSERN

Lead partner:
Universität für Weiterbildung Krems (Donau-Universität Krems)

Scientific management:
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Additional participating institutions:
Universitätsklinikum St.Pölten

Research field:
Microbiologie, Medizinische Hygiene

Funding tool: Basic research projects

Project-ID: LS17-015

Project start: 01. Jänner 2019

Project end: will follow

Runtime: 36 Monate / ongoing

Funding amount: € 290.514,00

Brief summary:
Pseudomonas aeruginosa is a high-risk bacterial pathogen. Therefore, rapid detection and further identification are important targets in medicine, food industry and drinking water hygiene to ensure public health and safety. P. aeruginosa is a widely spread soil and water bacterium and is regarded as a major hospital germ. Infections with P. aeruginosa are a common cause of morbidity and mortality worldwide. Current methods for detection are often based on classical cultivation, microscopic and biochemical analyzes, and also molecular methods are increasingly used. However, all of these procedures are often time-consuming, expensive, require special equipment and trained personnel.
An electrochemical methodology for a Pseudomonas detector is to be developed in the planned NFB project. This biosensor can facilitate the detection of P. aeruginosa as a "pretester" and as an early warning system accelerate the overall diagnosis of this bacterial pathogen.
In the cultivation of the bacterium on cetrimide agar, the release of pyocyanin, a blue-green secondary metabolite, which is specifically produced by P. aeruginosa, results in colored colonies. However, pyocyanine also has redox-active properties and, therefore, can be used for a specific, electrochemical detection of these bacteria. The electroactive properties of pyocyanine can be determined with different voltametric and amperometric methods, e.g. cyclic voltammetry.
This bacterial secondary metabolite serves as a starting point for the development of methods, which is carried out at the Danube University Krems, Center for Integrated Sensor Systems, Working Group "Water and Environmental Sensors". The developed procedure is then to be tested with hospital samples from the Clinic Institute for Hygiene and Microbiology, University Hospital St. Pölten. Finally, the results obtained from the detected infection exciter are to be evaluated by the novel sensor and the validated hospital analysis.

Keywords: