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Detection of Uropathogenic *Escherichia Coli* in Urine Using an Immunobiosensor Based On Antigen-Antibody Biorecognition, Coupled With Fluorescence Detection and Bead-Injection Analysis

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Extended Abstract

Uroinfections, primarily caused by pathogenic bacteria such as uropathogenic *E. coli* (UPEC), represent a significant health challenge in today's world. The gold standard for identifying pathogens that cause uroinfection in urine samples is microbiological cultivation, which can take several days. Alternative laboratory methods, such as quantitative polymerase chain reaction (qPCR) and matrix-assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectrometry, can also be employed to identify these pathogens. A promising avenue for the rapid identification of pathogens is the use of biosensors. The aim of the current study was to develop a biosensor for the swift detection of UPEC in urine samples, aiming for a limit of detection below 10^3 CFU/mL—crucial for diagnosing recurrent uroinfections and associated conditions [1]. Initially, the pathogens were captured onto a single-use column, followed by specific detection using *E. coli* antibodies conjugated with a fluorescent marker. Utilizing a bead-injection analysis platform for fluidics enabled us to achieve limits of *E. coli* detection and quantification in 150 µL urine samples of <3 cells/mL and <5 cells/mL, respectively. The total analysis time, including complete system regeneration, was 17 minutes [2]. The results obtained from the biosensor showed a strong correlation with those from other methods, confirming that the complex urine matrix of UPEC patients did not interfere with the biosensor measurements.

References

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