Selected topic: INDUSTRIAL AND FOOD MICROBIAL BIOTECHNOLOGY (Biotechnology and synthetic microbiology)

CARBON AND GOLD APTASENSORS FOR THE DETECTION OF *Escherichia coli*

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Fundamental for life, water has to be continuously monitored before human consumption. One of the most diffuse pathogens that can be found in water is *Escherichia coli*, which in 2022 caused 7117 human cases of Shiga toxin-producing *Escherichia coli* (STEC) infections in Europe. As the classical microbiological analysis can require up to 5-7 days to provide a response related to the presence of *E. coli* contamination in a sample, it is obvious the need for a specific rapid method able to give the results in a short time.
Thus, the development of electrochemical biosensors for the detection of microbiological contaminants in water is important. More specifically, aptasensors are biosensors built by using specific aptamers (single-stranded DNA sequences) as biological elements. In this study, an aptamer designed in silico is used to detect *Escherichia coli* cells in water samples, and the performances of gold and carbon screen-printed electrodes are compared. Different concentrations of *E. coli* cells were tested to optimize the aptasensor.
The results show a high sensibility of the new tools, with the possibility to detect a concentration of 10^1 CFU/ml of *E. coli* cells in a water sample. By testing the aptasensor with negative controls (*Enterococcus faecium* and *Salmonella*), a good specificity is reached too.
According to the results obtained for the specificity and sensibility, the short time required, and the portability of the equipment, biosensors appear to be a promising technique that can be directly used for in-field analysis in the detection of pathogens in liquid matrixes.

KEYWORDS: biosensor; aptasensor; *Escherichia coli*; rapid method

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