BIOSENSOR DEVELOPMENT FOR THE DETECTION OF *ESCHERICHIA COLI* CELLS

Eerik Jõgi, Ingrid Väling and Toonika Rinken
Institute of Chemistry, University of Tartu, Ravila 14a, 50411 Tartu, Estonia
e-mail ejogi@ut.ee

Escherichia coli is a Gram-negative, facultative anaerobic, rod-shaped coliform bacterium of the genus *Escherichia* that is commonly found in the lower intestine of warm-blooded organisms (endotherms) and is used as an indicator of faecal contamination in environment. Gold standards for the detection *E. coli* and other pathogens are microbiological culture-based tests. These tests are very robust for the detection of live pathogen cells, although it can take several days to get the results. A good alternative for the detection of *E. coli* in natural waters can be an immunobiosensor. Although biosensor results can be obtained quickly, biosensors for bacteria commonly have a major shortage – these sensors do not allow identifying weather the target cells are live or not. This means that depending on the method of analyses – microbiological culture, antibody-based biosensor or quantitative PCR analysis, the estimated cell numbers are different. The purpose of this work was to compare different analysis methods for the estimation of *E. coli* numbers in natural water samples.

Water samples were collected from the popular beach of Anne Channel in Tartu from June to September 2018. The microbiological analysis of the sample were done by membrane filtration method, and cultivation on chromogenic coliform agar. The number of *E. coli* colonies in different sampling points was in the range 50 – 3250 CFU/100 ml.

The preliminary results of the biosensor system (based on *E. coli* specific detecting antibody conjugated with a fluorescent marker) and quantitative PCR (targeted to *E. coli* specific *ybbW* gene) were quite similar and both indicated much higher *E. coli* concentrations than microbiological cultivation – for example, the *E. coli* concentration obtained with biosensor was 4.3 x 10^6 CFU/ 100ml; with qPCR 3.5 x 10^6 CFU/ 100 ml, compared to 53 CFU/ 100 ml acquired with microbiological method.

Euroopa Liit
Euroopa
Regionaalarengu Fond

Eesti
tuleviku heaks