Fabrication of Highly Specific Electrochemical Genosensor for the Detection of Escherichia coli

Singh, Kunal (School: Maharaja Agarsain Public School)

The electrochemical Geno-sensor is one of the most promising methods for the rapid and reliable detection of bacteria. In the present work, the Geno-sensor was used to detect Escherichia coli. The primer and probes were designed using NCBI (National Center for Biotechnology Information) database and Sigma-Aldrich primer/ probe software. E. coli is a Gram negative, facultative anaerobic, nonsporulating bacteria that lives inside the intestinal tracts of humans and warm-blooded animals. Some of the species of E. coli cause gastroenteritis, urinary tract infections, bacteremia and neonatal meningitis in human and animals. Apart from this the bacteria is the most commonly used indicator of public health risks associated with water. In this present study we used the combination of the hypervariable-conserved region of 16s rRNA as classified tags to design E. coli specific probe. Several bioinformatic tools were used for the development of this universal E. coli specific primer. Use of gold for DNA attachment through a thiol group has been used to efficiently conduct and amplify electrochemical signals while retaining biological activity. Stability studies of prepared ssDNA/Au bio-electrodes were performed via guanine oxidation monitoring in PBS using Differential pulse voltammetry till 60 days. The sensitivity and specificity of this E. coli specific probe/primer was validated with the corresponding full-length sequencing and in real food samples contaminated artificially. This bio-sensor tool provides a novel platform for faster and easy detection of clinically important E. coli strains. Compared with other electrochemical DNA biosensors, we conclude that this Geno-sensor provides for very efficient detection of bacteria.