

## Electrochemical study of *Escherichia coli* bacterial culture with the cloned gene for metallothionein (MT-3) and effect of cadmium and lead ions

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### ABSTRACT

The most common cause of environmental contamination by heavy metals is agriculture and industry. Because of this issue, it is necessary to look for new techniques to prevent this contamination particularly in terms of human health and the environment. For these purposes, the electrochemical methods for detection of interactions between human metallothionein genes cloned in *Escherichia coli* bacterial culture with heavy metal ions were used.

This study was focused on the application of electrochemical methods for study of bacterial strain *Escherichia coli* without and with cloned human metallothionein gene (MT-3) before and after the application of cadmium or lead ions in four concentrations (25, 50, 75 and 150  $\mu\text{M}$ ).

Study demonstrated changes in electrochemical metallothionein records through interaction with the heavy metal ions. This interaction caused the decrease in signal of Cat2 peak with increased interaction time due to the binding of metal ions to cysteine. Electrochemical determination also proved that the cadmium ions are more binding into the bacterial cells without the presence of plasmid with the MT-3 than lead ions. Then completely opposite situation was observed for the *Escherichia coli* strain with MT-3 gene. This was probably caused due to the higher affinity of MT-3 to lead ions than to cadmium ions.

Our results describe the analysis of *Escherichia coli* bacterial strains and effect of transformed gene presence.

**Keywords:** Cloned gene; *E. coli*; Electrochemistry; Heavy Metal Ions; Metallothionein;

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