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Electrochemical Biosensor for Detection of Cadmium in Milk

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Exposure to cadmium is among the main threats to human health from heavy metals. Among heavy metals cadmium and lead are the main contaminant of milk (*Alonso et al., 2003, Ayar et al., 2008*). The permissible limit of Cd in milk has not been defined though it is 3 ppb for mineral water as defined in CODEX STAN 193-1995 rev.2009. In the present study an electrochemical biosensor has been developed for the detection cadmium in milk. *Bacillus badius* whole cells, an isolate of biosensor technology lab, were used as biocomponent in the study, immobilized at the tip of carbon paste electrode. The principle of biosensor was based on the inhibition of urease activity, was measured in terms of NADPH through cyclic voltammetry at a scan rate of 100mV/s. *Bacillus badius* is a urease producing micro-organism; urease and Glutamate dehydrogenase of the cell were used as bi-enzymatic machinery in the assay. Ammonium ion produced by urease activity along with NADPH was utilized in the reaction catalyzed by Glutamate dehydrogenase. Excess of NADPH was measured through cyclic voltammetry. Inhibition of urease leads to lesser production of ammonium ion thereby increase in unutilized NADPH and therefore increases the current. The developed biosensor was applied to natural milk and spiked milk samples. A detection limit of as low as 0.5ppb has been achieved. Cadmium is showing specificity over lead there is no interference of lead. Application of whole cells in the study as bi-enzymatic machinery is making the practice cost effective.