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Electrochemical detection of microcystin-LR based on its deleterious effect on DNA

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Abstract

This work reveals the deleterious effect of microcystin-LR (MC-LR) on the conformation of DNA and develops an electrochemical biosensor for detection of MC-LR. The biosensor is prepared by physically immobilizing calf thymus DNA (ctDNA) on gold electrode. In the presence of MC-LR, the conformation change of immobilized ctDNA decreases the electron transfer impedance, thus enhances the amperometric response. The proposed method shows a linear range of 4 to 512 ng/L and a detection limit of 1.4 ng/L, which is 700-fold lower than the guideline level suggested by the World Health Organization. The detection results are in good agreement with those from the conventional HPLC method. This biosensor possesses good stability against other components in wild water sample, and has been used for detection of MC-LR in local water bodies, indicating its application promise.

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