

## *Abstract*

# **Designing of Liposomal Network based Electrochemical Biosensor for Detection of Telomerase Activity in Cancerous Cells**

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**Introduction:** Telomerase is considered as an important tumor marker for early cancer diagnostics. In the present study, an electrochemical method based on liposomal signal amplification platform is proposed for simple, PCR-free, and highly sensitive detection of human telomerase activity, extracted from A549 cells.

**Methods:** In this strategy, telomerase reaction products, which immobilized on streptavidin coated microplate, hybridized with biotinylated capture probes. Then, dopamine-loaded biotinylated liposomes are attached through streptavidin to biotinylated capture probes. Finally, liposomes are ruptured by methanol and the released-dopamine is subsequently measured using differential pulse voltammetry technique by multi-walled carbon nanotubes modified glassy carbon electrode.

**Results:** The average diameter of the prepared liposomes was 117.1 nm, and the PDI was 0.191. In order to improve the accuracy and reliability of the method, the washing process was optimized and it was proved that 5 times washing steps is enough to make sure unbound liposomes and unloaded dopamine have been mainly washed off. By Plotting the DPV peak current against telomerase activity from 10 to  $4 \times 10^3$  A549 cells, the resulting curve showed a linear relationship in the range of 10–500 cells. Therefore, by using this strategy, the telomerase activity extracted from 10 cultured cancer cells could be detected (RSD: 13.18%).