A simple and label-free detection of telomerase activity using Cu(II)-coordinated GpG-duplex DNA as peroxidase mimetics

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Telomerase is a specialized ribonucleoprotein that add the telomeric repeats (TTAGGG)n to the telomeric end of human chromosome during cell division and reported as one of the tumor biomarker. The elevated amount of telomerase shows association with cancerous cells, suggesting that telomerase could be used as biomarker for cancer detection and treatment. By considering this fact, we reported a novel, simple, cheap and polymerase chain reaction (PCR)-free telomerase activity detection method based on Cu(II) -coordinated GpG-duplex DNA as peroxidase mimetics. We used telomerase primer (TS) to initiate polymerization reaction in the presence of telomerase enzyme extracted from cancerous cells. In the presence of telomerase add telomeric repeat sequence at 3' end of TS. GpG-duplex formed after addition of complementary strands to telomereic repeats and then peroxidase mimetics are formed through unique coordination between Cu2+ ions and DNA double strand containing consecutive G-C base pairs (GpG-duplex). By employing this new sensor, we detected telomerase at a concentration as low as 200 cells/uL.