Electronic Supplementary Material (ESI) for Analytical Methods.

In situ imaging of intracellular human telomerase RNA with molecular beacon-functionalized gold nanoparticles

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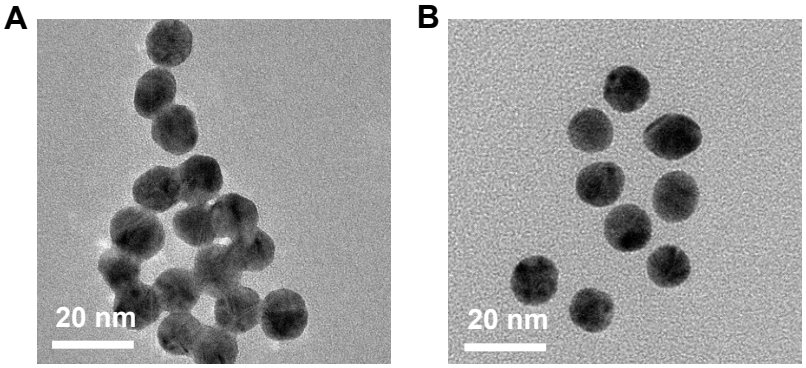

Fig. S1 TEM micrographs of (A) AuNPs and (B) probe.

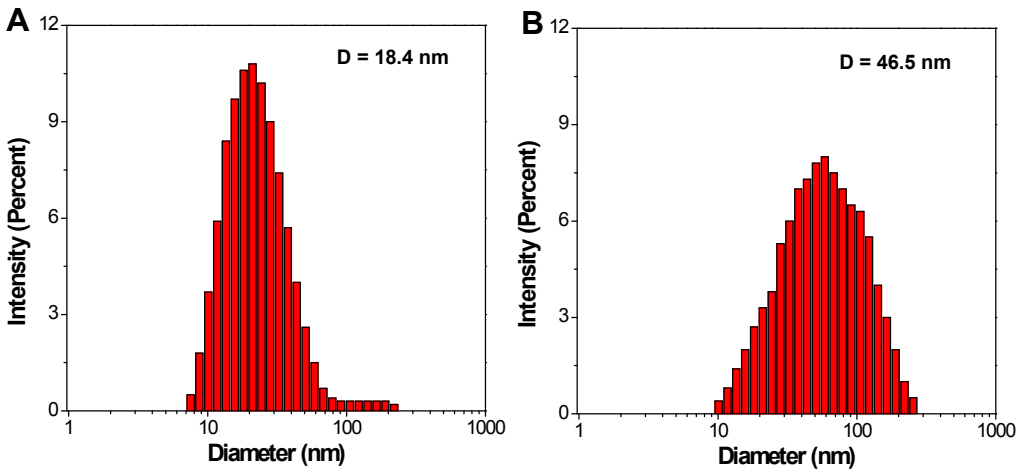

Fig. S2 Dynamic light scattering characterization of (A) AuNPs and (B) probe.

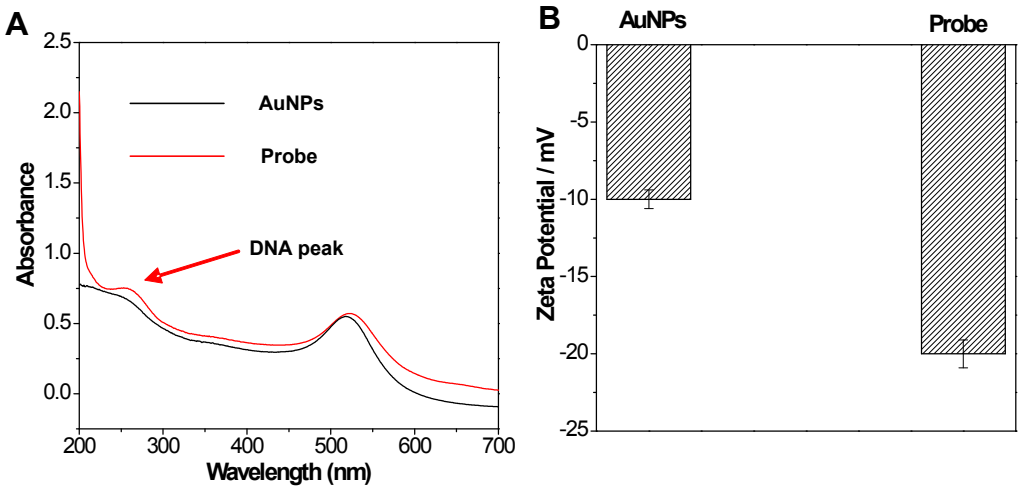

Fig. S3 Characterization of AuNPs and probe. (A) UV-vis absorption spectra of AuNPs (black line) and probe (red line). (B)Zeta potentials of AuNPs and probe in H_2O. The error bars represent standard deviation (± SD).

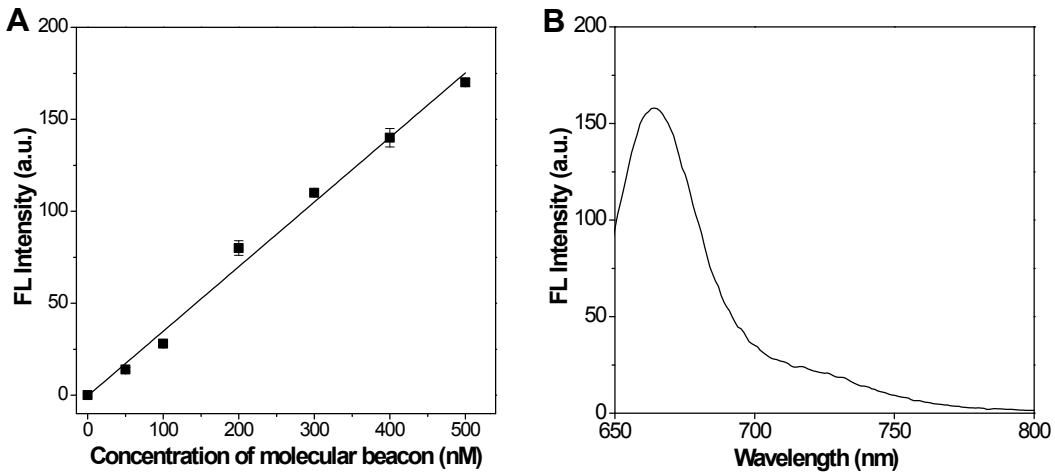

Fig. S4 Quantification of the number of molecular beacon strands per AuNP. (A) The molecular beacon concentration was measured using fluorescence against a linear working curve. (B) Fluorescence spectrum of supernatants containing molecular beacon. The error bars represent standard deviation (± SD).

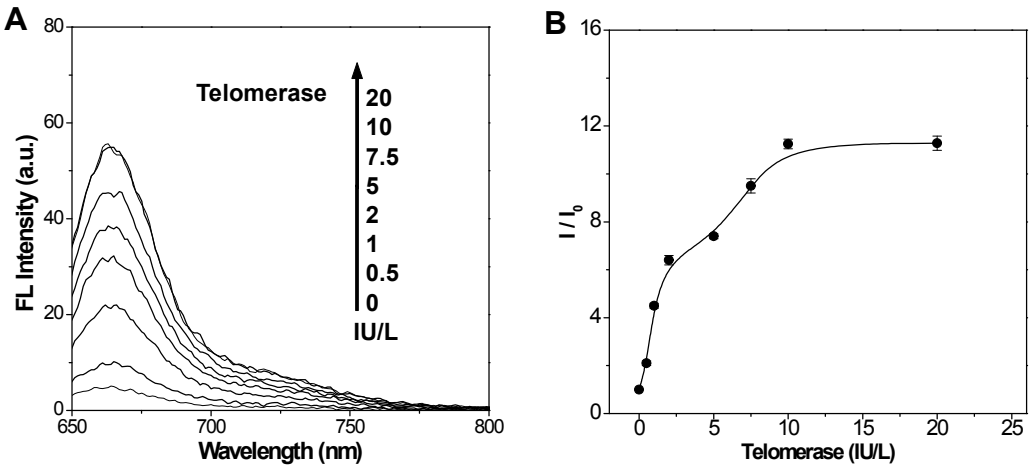

Fig. S5 Detection of hTR *in vitro*. (A) Fluorescence spectra of probe response to different concentration of telomerase. (B) Plot of fluorescence intensity ratio (I/I_0) vs telomerase concentration. The error bars represent standard deviation (± SD).

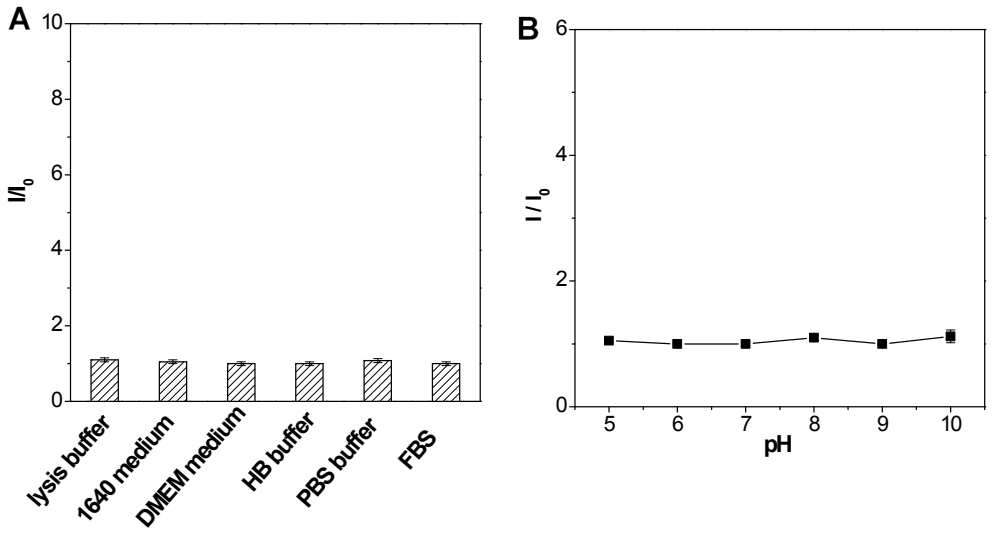

Fig. S6 Stability of probe. The probe was co-incubated separately with different media including lysis buffer, DMEM medium, 1640 medium, HB buffer, PBS buffer and FBS by co-incubation for 3 h at 37 °C, and fluorescent spectra were recorded. In order to explore pH effect on probe, the fluorescent spectra of probe were measured in PBS buffer with different pH value from 5.0 to 10.0 at 37 °C. (A) Fluorescent enhancements in various media. (B) Fluorescent enhancements with different pH values. The error bars represent standard deviation (± SD).

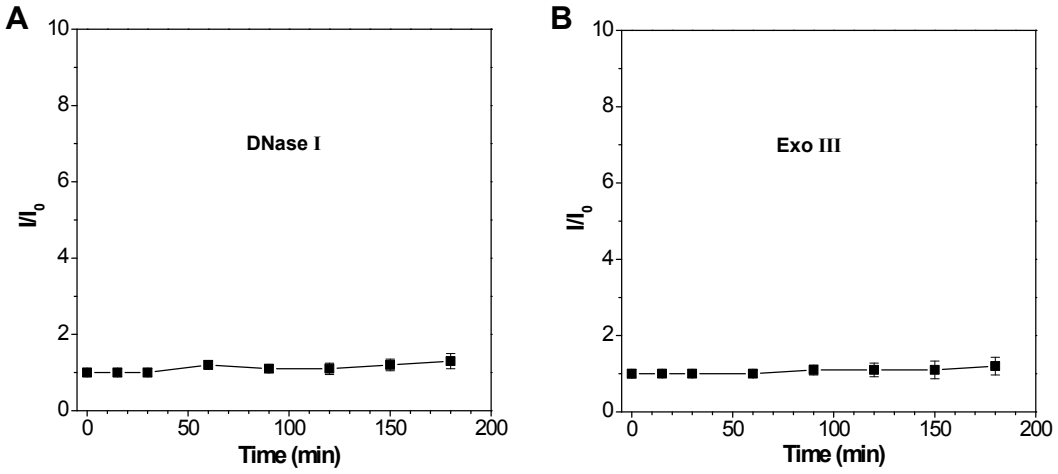

Fig. S7 Tolerance of probe with DNA nuclease. Two typical DNA nuclease DNase I and Exo III were separately co-incubated with probe in PBS buffer at 37 °C for 3 h, and the time-dependent fluorescent spectra were measured. (A) Fluorescent enhancements for DNase I. (B) Fluorescent enhancements for Exo III. The error bars represent standard deviation (± SD).

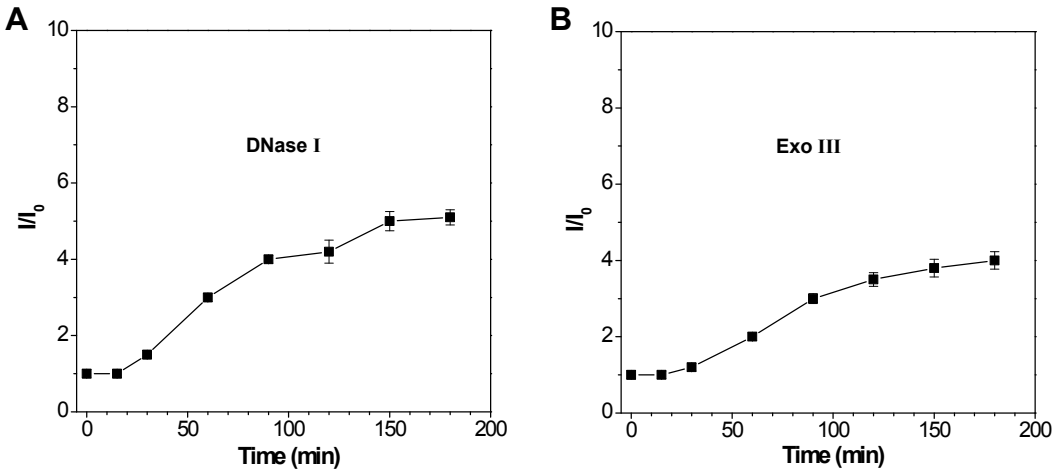

Fig. S8 Tolerance of free oligonucleotides with DNA nuclease. Two typical DNA nuclease DNase I and Exo III were separately co-incubated with probe in reaction buffer at 37 °C for 3 h, and the time-dependent fluorescent spectra were measured. (a) Fluorescent enhancements for DNase I. (b) Fluorescent enhancements for Exo III. The error bars represent standard deviation (± SD). (Here, AuNPs were replaced with quencher groups: BHQ2.)

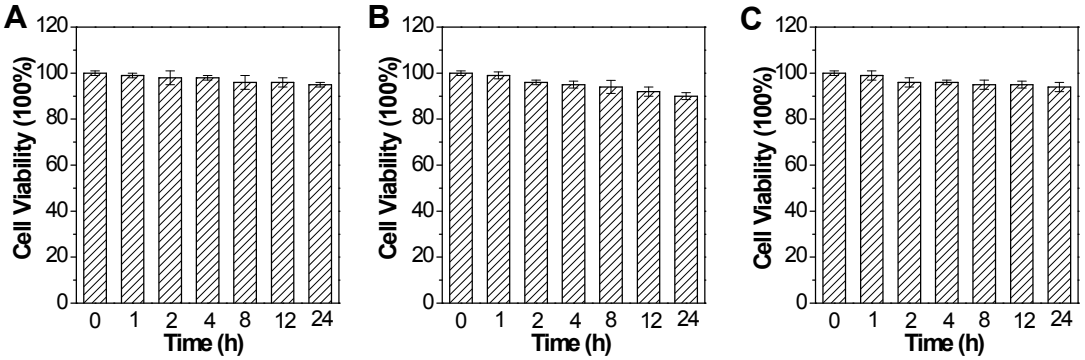

Fig. S9 Viability of (A) a549 cells, (B) QSG cells and (C) RAW cells in the presence of the SNA probe measured with the MTT assay. Cell viability remains unchanged even after exposure to the SNA probe (6 nM) for extended time periods such as 24 h. The error bars represent standard deviation (± SD).

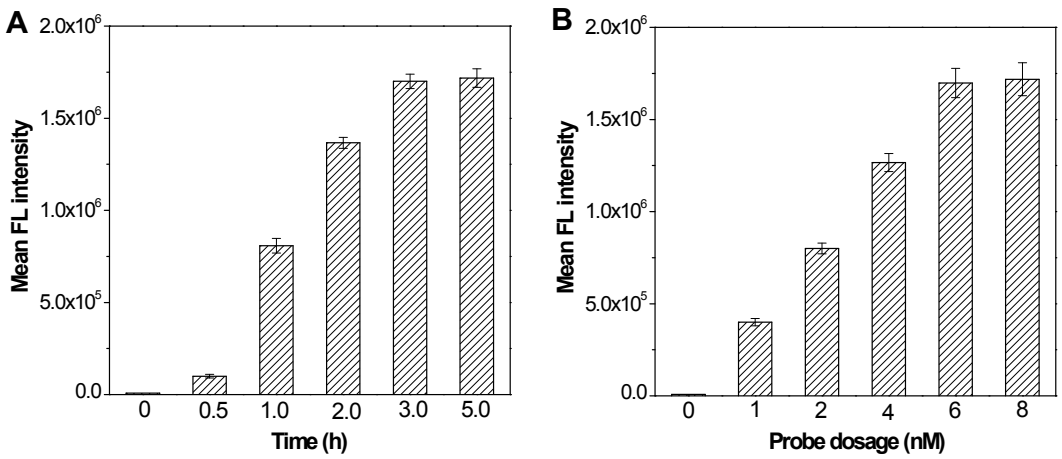

Fig. S10 Flow cytometry analysis of hTR in A549 cells. (A) Flow cytometry analysis of A549 cells after incubated with probe (6 nM) for different time. (B) Flow cytometry analysis of A549 cells after treated with the different dosage of probe for 3 h. Average fluorescent intensities obtained from over 10,000 cells per cell line after treatment. The error bars represent standard deviation (± SD).

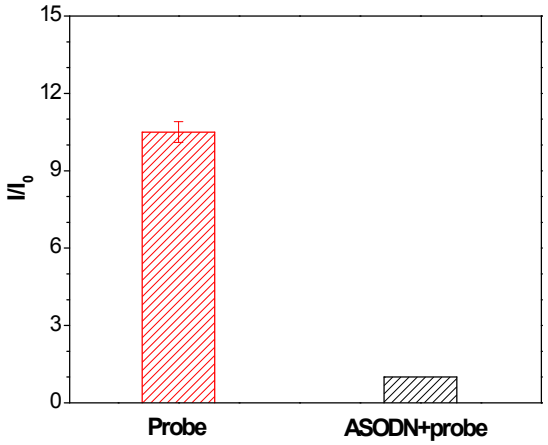

Fig. S11 Control experiments for hTR in A549 cells. In the control experiment, the A549 cell lysates were pre-incubated with ASODN and then treated with probe. The error bars represent standard deviation (± SD).

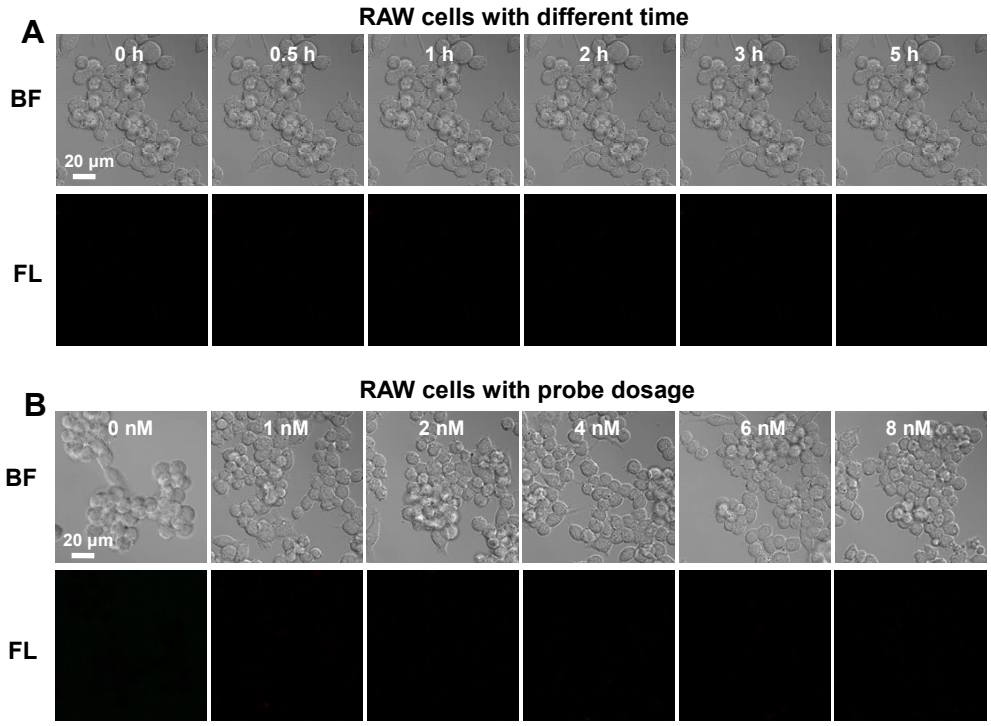

Fig. S12 Fluorescent imaging of hTR in RAW cells (excitation: 633 nm, emission: 640−750 nm). (A) Time-dependent fluorescent images of RAW cells incubated with the probe (6 nM). (B) Dosage-dependent fluorescent images of RAW cells treated with the probe for 3 h.