Supporting Information

Single Primer Based Multi-site Strand Displacement Reaction Amplification Strategy for Rapid Detection of Terminal Deoxynucleotidyl Transferase Activity

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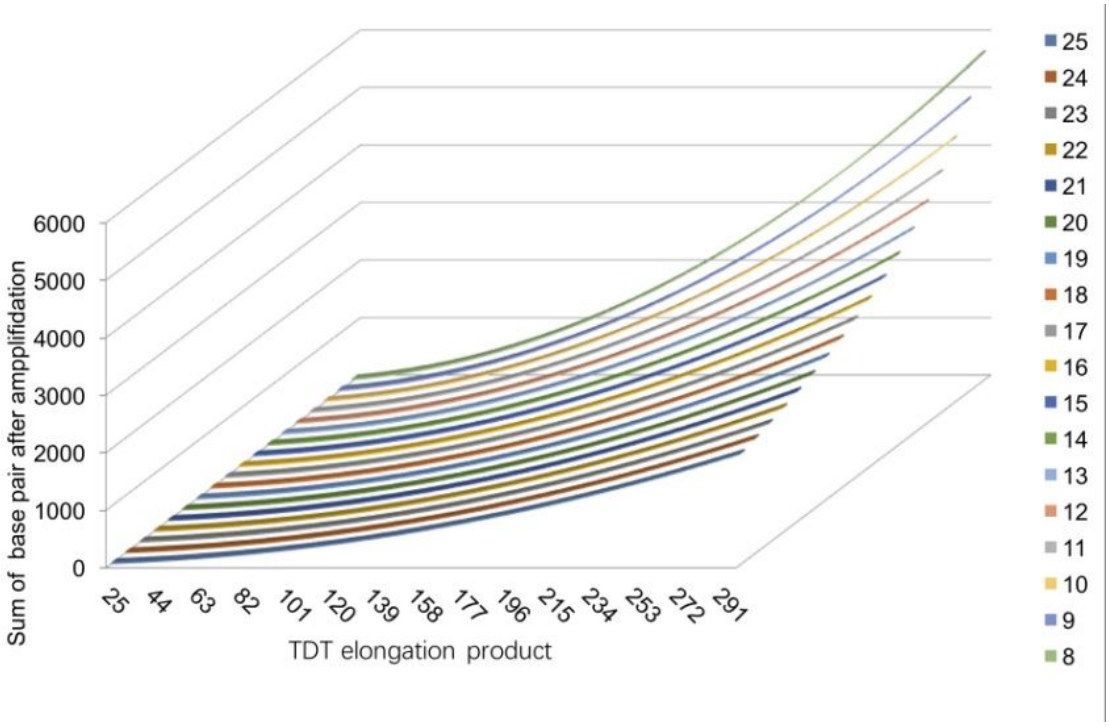

Fig. S1 Relationship between the yield of final amplified product and primer length. The abscissa axis represents the average length of TdT extension product (the unit is bp), and the ordinate axis represents the total number of double-stranded base pairs in the final amplified product. The length of primer ranged from 8 to 25 bp and list on the left. We assume that the primer oligo dT contains n base units oligo $(dT)_n$. The average length of TdT elongation product is x bases. Then the number of the total base pair (Tbp) produced from one piece of primer oligo dTn is $Tbp = ((x^2/n) + x)/2$.

From the principle of this strategy, it is obviously shorter primer can produce more dsDNA.

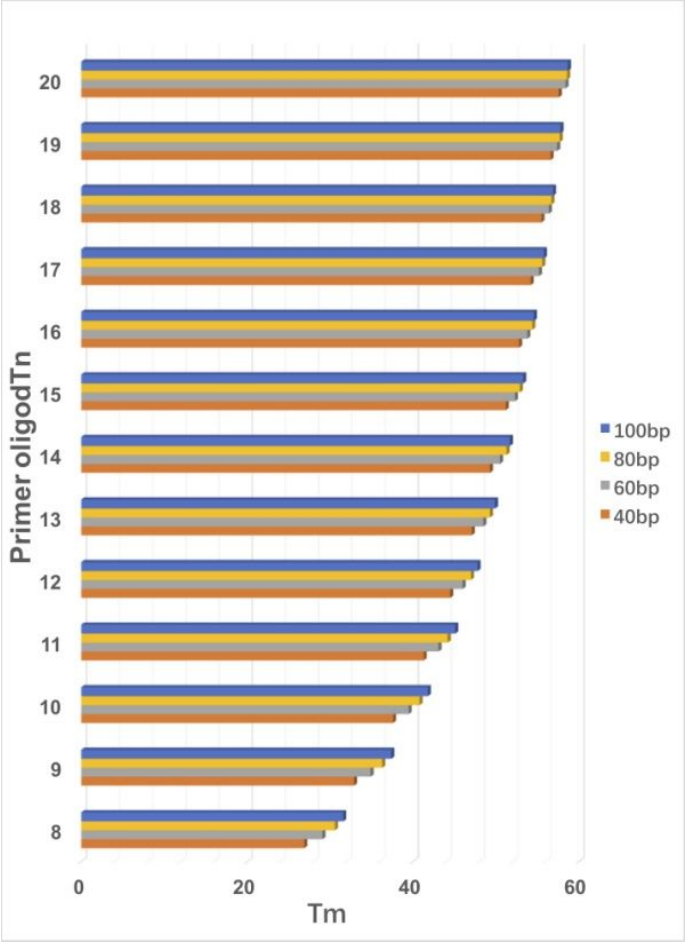

Fig. S2 Relationship between the melting temperature (X-axis, the unit is ℃) of hybrid product of primer-TdT elongation product and primer length (Y-axis, the unit is bp). The color bars represent assumed different length of TdT elongation product.

Table S1. Oligonucleotides used in the experiments.

name	sequence (5′to 3′)
T8	TTTTTTTT
T9	TTTTTTTTT
T10	TTTTTTTTTT
T11	TTTTTTTTTTT
T12	TTTTTTTTTTTT
T15	TTTTTTTTTTTTTTT
T20	TTTTTTTTTTTTTTTTTTTT
T25	TTTTTTTTTTTTTTTTTTTTTTTTT
T30	TTTTTTTTTTTTTTTTTTTTTTTTTTTTTT
T40	TTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT
A20	AAAAAAAAAAAAAAAAAAAA
A30	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
A40	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Table S2. The comparison of our method with other methods of TdT activity detection.

Sensors	Detection limit (U)	Linear range (U)	Total reaction time	Reference
G-quadruplexes	0.05	0.3 ~ 4	160min	24
AgNC-based biosensors	0.0318	0 ~ 3	205min	12
iridium(III)-based i-motif probe	0.0125	0 ~ 0.4	130min	25
TdT-generated polyT-templated CuNP strategy	0.0375	0 ~ 5	135min	23
quantum dot-based nanosensor	5×10^{-5}	2×10^{-5}~ 2×10^{-2}	70min	26
DNA-AgNCs/GO/GCE	4×10^{-4}	0.002~0.45	197min	21
DNA-CuNCs/GO/GCE	5×10^{-4}	0.0025~0.8	152min	20
MSSDA	1.35×10^{-5}	4×10^{-5}~ 4×10^{-2}	95min	This work

Table S3. The recovery determination of TdT in artificial serum sample (n=4)

Samples	Added U	Found U	Recovery (%)	RSD (%)
Serum 1	0.0005	0.00054	108.2	9.7
Serum 2	0.001	0.0011	110.0	8.5
Serum 3	0.02	0.0187	93.5	11.3