Supporting Information for

Portable glucose meter-utilized label-free and washing-free telomerase assay

Hyo Yong Kim[a†], Chang Yeol Lee[a†], Hansol Kim[a], Ki Soo Park[b*] and Hyun Gyu Park[a*]

[a] Department of Chemical and Biomolecular Engineering (BK21+ Program), KAIST, 291 Daehak-ro, Yuseong-gu, Daejeon 34141, Republic of Korea.

[b] Department of Biological Engineering, College of Engineering, Konkuk University, Seoul 05029, Republic of Korea.

[*] To whom correspondence should be addressed.

E-mail: hgpark@kaist.ac.kr (H.G. Park); Phone: +82-42-350-3932; Fax: +82-42-350-3910.

E-mail: kskonkuk@gmail.com (K.S. Park); Phone: +82-2-350-3742; Fax: +82-2-350-3742.

[†] These authors equally contributed to this work.

Table S1. CV values from the samples containing HeLa cell extract at different numbers. CV values were calculated as S/M × 100 where M and S are mean and standard deviation of PGM signals based on the triplicate measurements, respectively. The concentrations of dNTP and TSP were 0.1 mM each and 0.5 μM, respectively. The times for telomere elongation and KCER were 90 and 60 min, respectively.

HeLa cell numbers	M	S	CV (%)
0	29.4	0.79	2.67
10	32.7	0.58	1.77
20	34.4	1.14	3.31
50	36.0	1.00	2.78
100	37.0	1.00	2.70
500	39.5	0.71	1.79
1,000	41.0	1.00	2.44
10,000	44.0	1.00	2.27

Table S2. Comparison of this method with previous PGM-utilized telomerase assays.

Material/Method	Detection limit		Assay time (min)	Limitations	Reference
	(cells/mL)	(cells)			
DNA-capped mesoporous silica nanoparticle	80	-	90	- Preparation of nanomaterial - Centrifugation step	1
Strand displacement amplification	400	20	220	- Labeling with invertase - Washing step	2
Invertase-labeled DNA	67	-	200	- Labeling with invertase - Washing step	3
Kinase-catalyzed cascade enzymatic reaction	125	5	150	-	This work

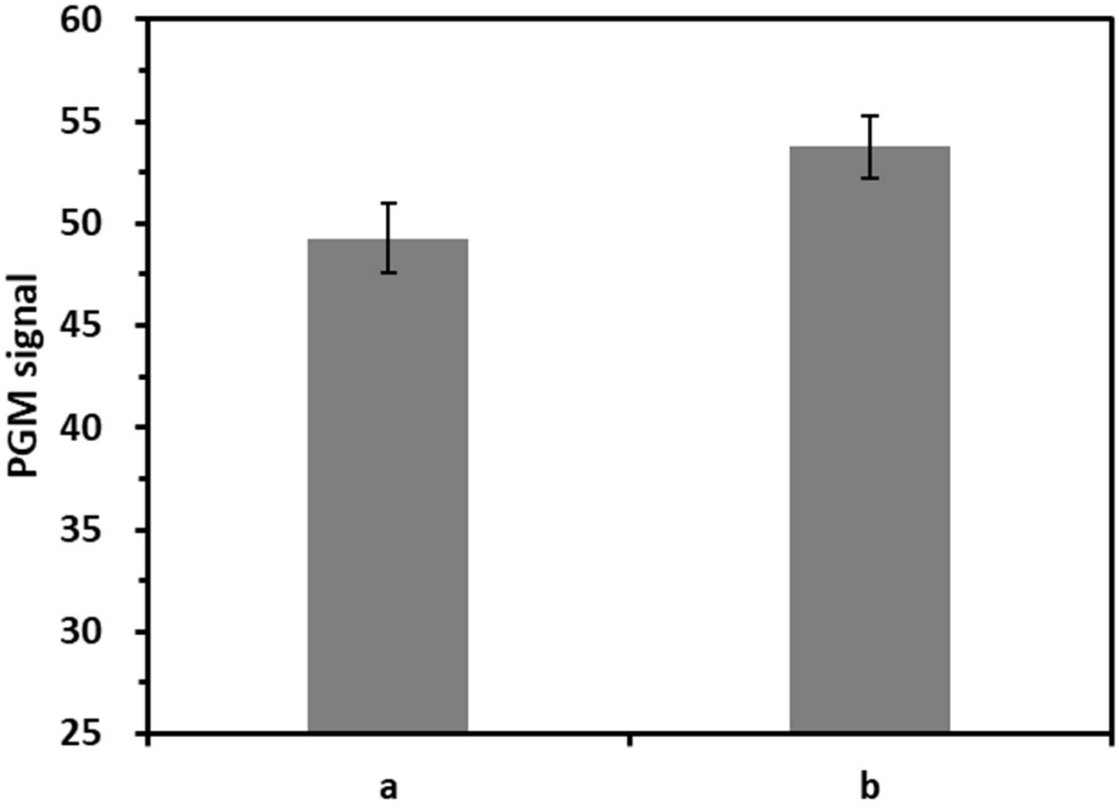

Figure S1. PGM signals from the samples (a) without and (b) with telomerase in the presence of HK only. The concentrations of dNTP and TSP were 0.1 mM each and 0.5 μM, respectively. The HeLa cell extract equivalent to 10^4 cells was added. The times for telomere elongation and KCER were 90 and 60 min, respectively.

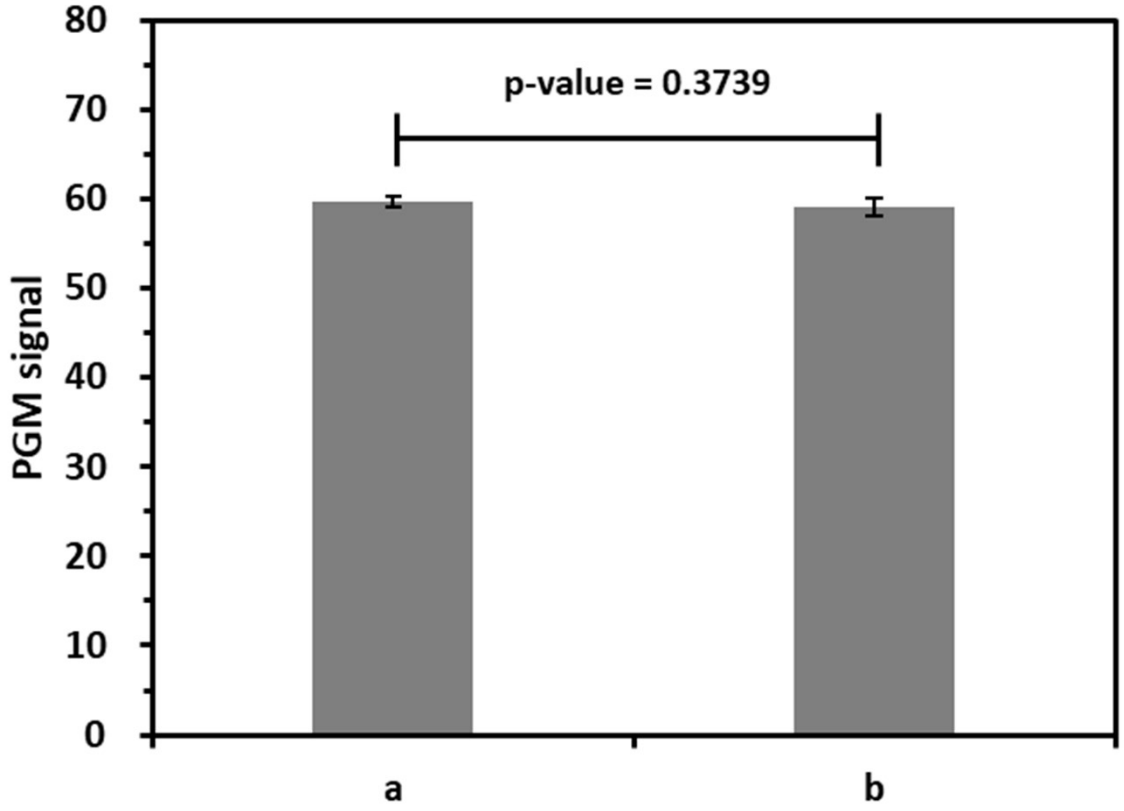

Figure S2. PGM signals from the KCER solutions in the (a) absence and (b) presence of HeLa cell extract equivalent to 10^4 cells. The time for KCER was 120 min.

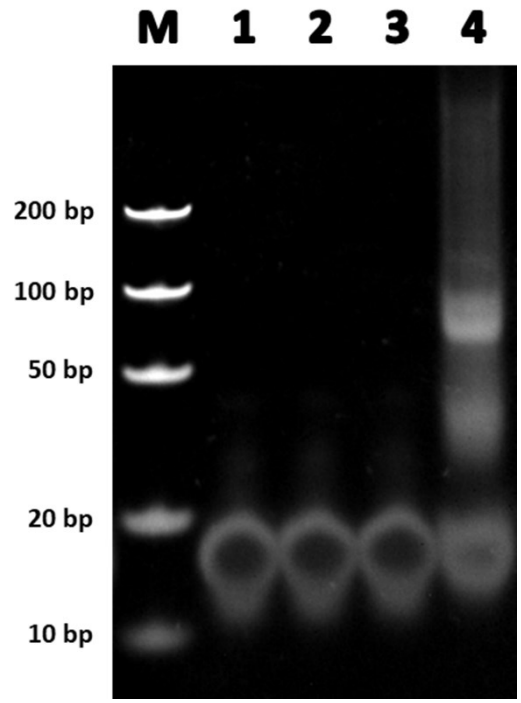

Figure S3. PAGE results of the samples in which each of dNTPs ((1) dATP, (2) dTTP, (3) dGTP, or (4) dCTP) was omitted. The concentrations of each dNTP and TSP were 0.1 mM and 0.5 μM, respectively. The HeLa cell extract equivalent to 10^4 cells was added. The time for telomere elongation was 90 min.

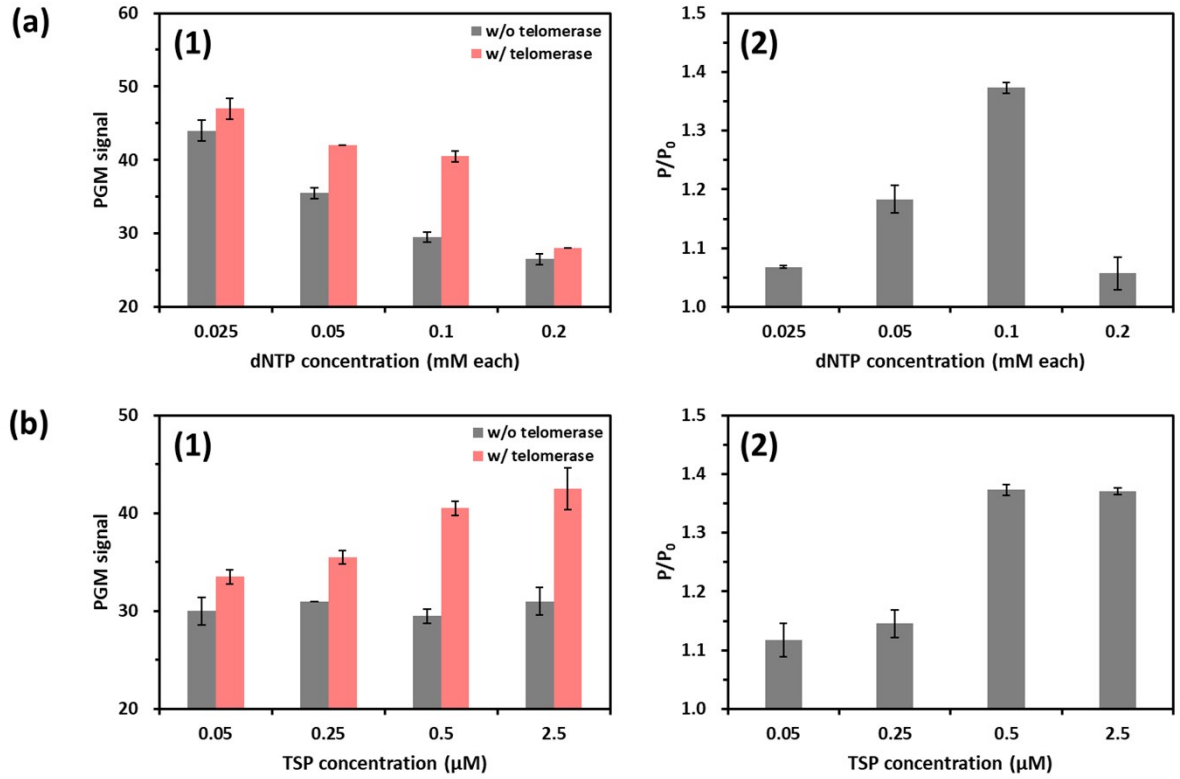

Figure S4. Optimization of the concentrations of (a) dNTP and (b) TSP by (1) measuring PGM signals from the samples in the absence and presence of telomerase and (2) examining PGM signal change defined as P/P_0 where P_0 and P are PGM signals in the absence and presence of telomerase, respectively. The concentrations of TSP and dNTP for the optimization of (a) dNTP and (b) TSP concentration were 0.5 μM and 0.1 mM each, respectively. The HeLa cell extract equivalent to 10^4 cells was added. The times for telomere elongation and KCER were 90 and 60 min, respectively.

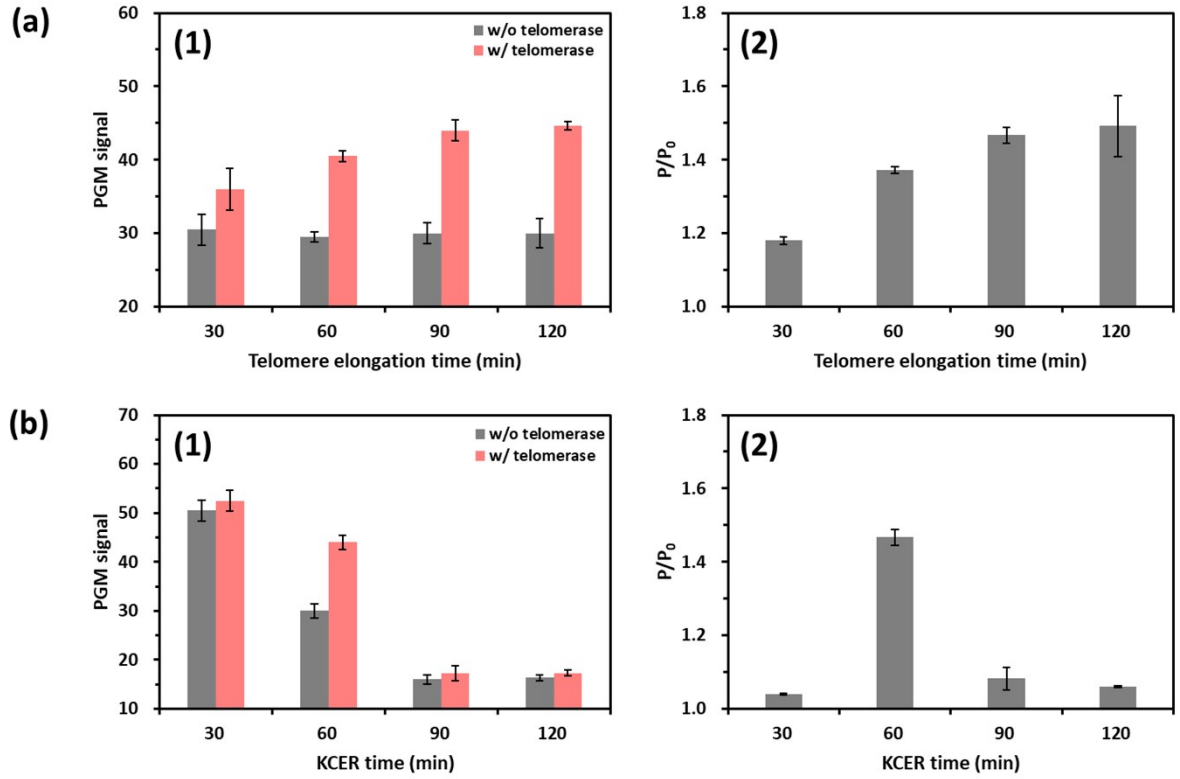

Figure S5. Optimization of the times for (a) telomere elongation and (b) KCER by (1) measuring PGM signals from the samples in the absence and presence of telomerase and (2) examining PGM signal change defined as P/P_0 where P_0 and P are PGM signals in the absence and presence of telomerase, respectively. The concentrations of dNTP and TSP were 0.1 mM each and 0.5 μM, respectively. The HeLa cell extract equivalent to 10^4 cells was added. The times of KCER and telomere elongation for the optimization of (a) telomere elongation and (b) KCER time were 60 and 90 min, respectively.

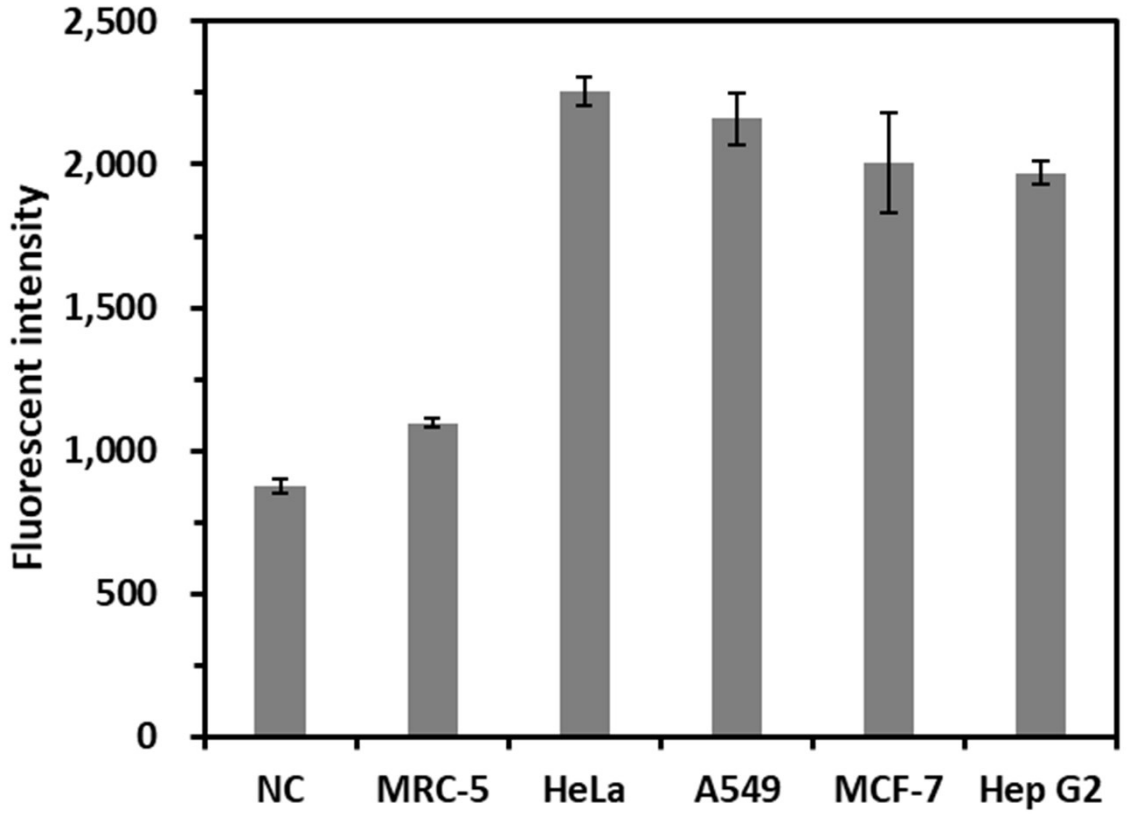

Figure S6. Telomerase activity of different types of cells including MRC-5, HeLa, A549, MCF-7, and Hep G2 determined by conventional TRAP assay. The fluorescence intensity of the samples in the presence of different types of cells was measured after the completion of TRAP assay. NC indicates the negative control without cell extract.

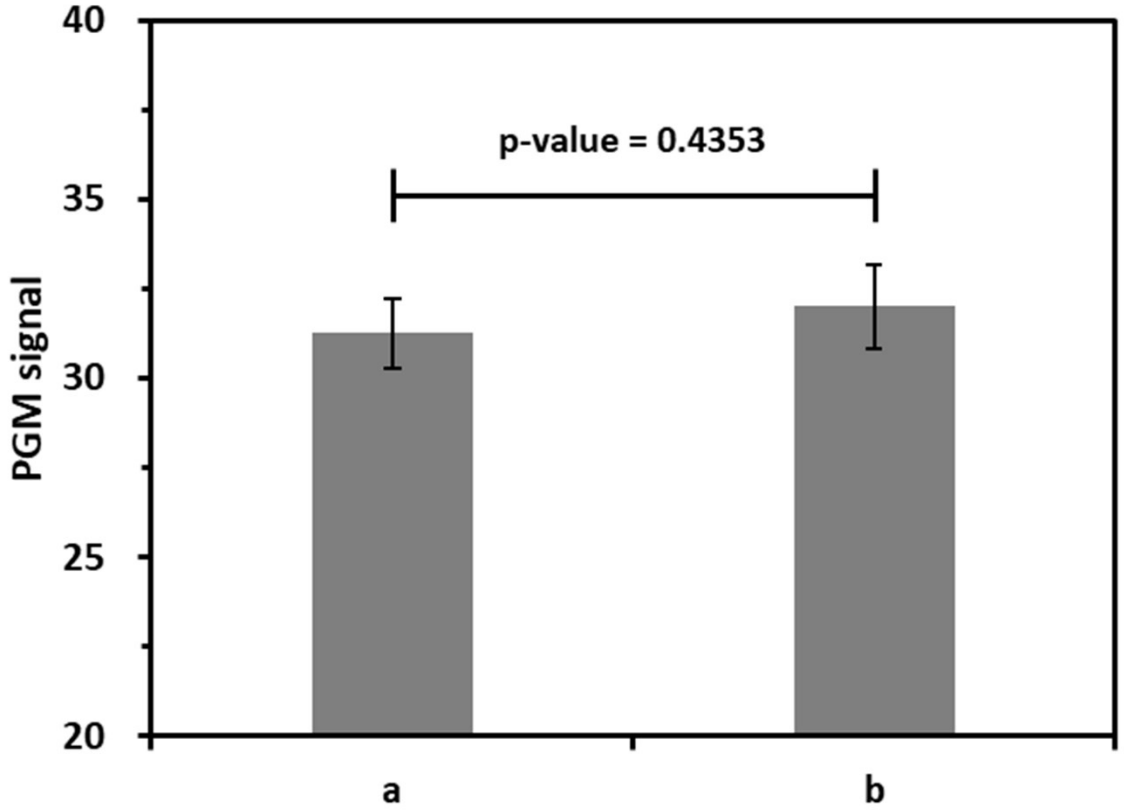

Figure S7. Measurement of PGM signals from the samples (a) without and (b) with AZT. The concentrations of dNTP, glucose, PEP, and AZT were 0.1 mM each, 2 mM, 2 mM, and 20 nM, respectively. The time for KCER was 60 min. The p-value was calculated based on unpaired two-tailed t-test.

References

1. Y. Wang, M. Lu, J. Zhu and S. Tian, *Journal of Materials Chemistry B*, 2014, **2**, 5847.

2. W. Wang, S. Huang, J. Li, K. Rui, J. R. Zhang and J. J. Zhu, *Scientific Reports*, 2016, **6**, 23504.

3. X. Zhu, H. Xu, R. Lin, G. Yang, Z. Lin and G. Chen, *Chemical Communications*, 2014, **50**, 7897.