SUPPLEMENTARY INFORMATION

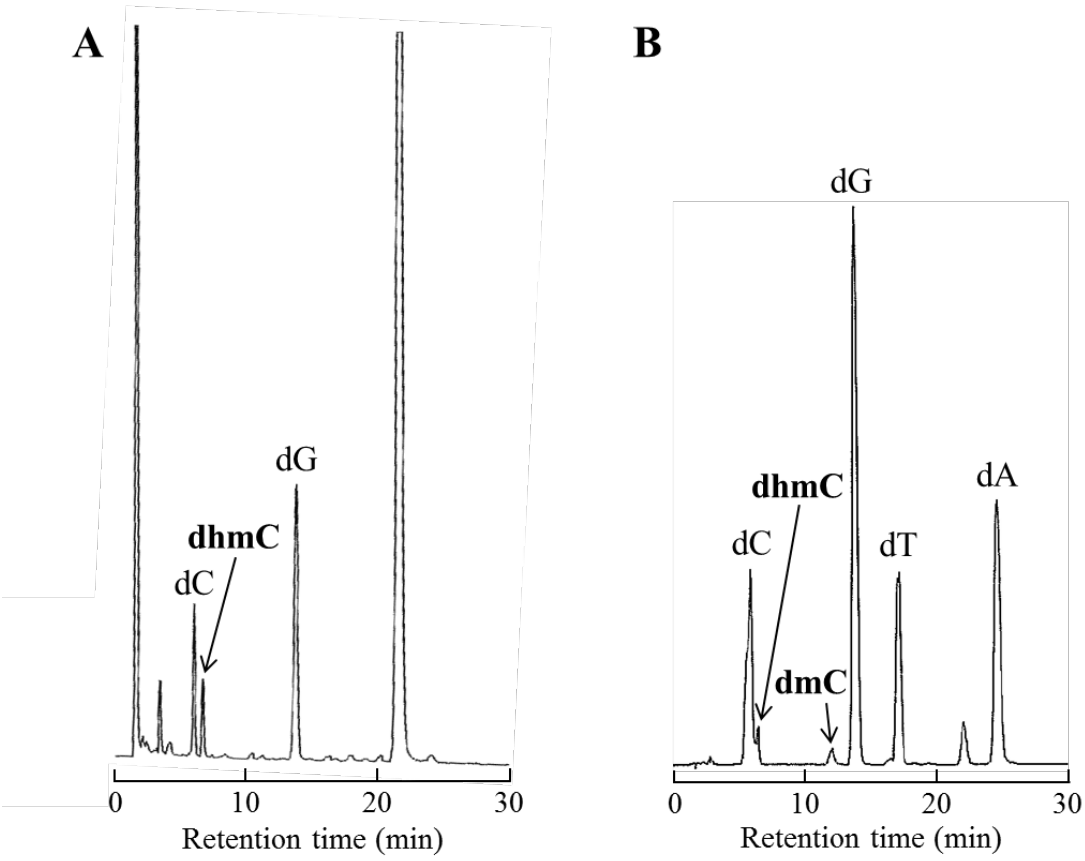

Fig. S1 Comparison of the reactivity between (**A**) CGmCGCG and (**B**) 20-mer DNAs. 16.3 μM DNA and 729 nM mTet1 protein were incubated at 37 °C for 1 hour (total volume: 50 μL). After incubation, half of the reaction mixture was purified by (A) illustra Micro Spin G-25 Columns (GE Healthcare Life Sciences) or (B) QIAquick Nucleotide Removal Kit (Qiagen). Purified DNAs were digested with nuclease P_1 (Wako) and Antarctic phosphatase (New England Biolabs) at 37 °C for 4 hours. All of the reaction mixture was used for HPLC analysis. Elution was with 50 mM ammonium formate containing 0-3% acetonitrile in a linear gradient at a flow rate of 1.0 mL/min for 30 minutes, at 40 °C.

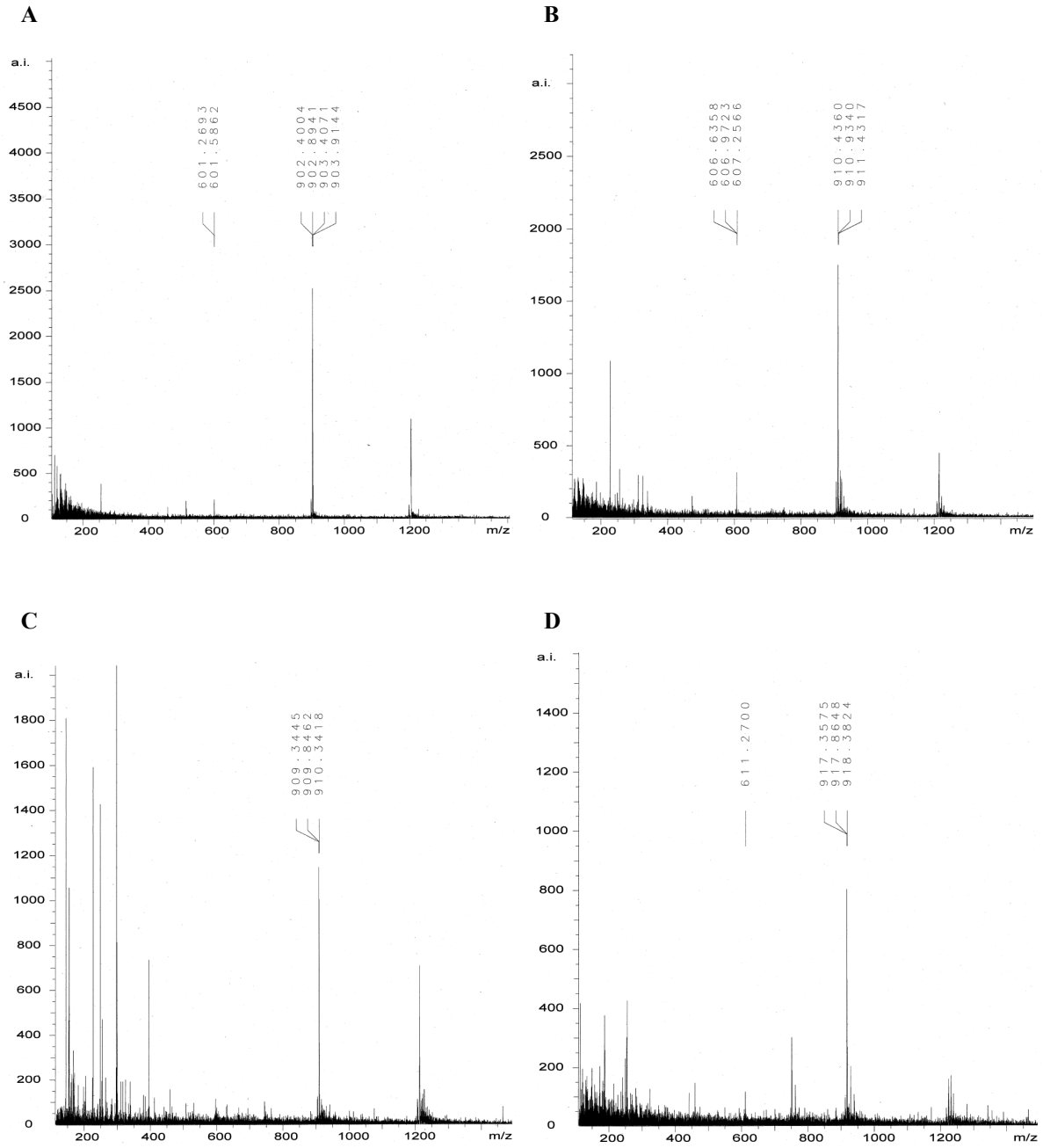

Fig. S2 ESI-TOF-MS analysis of synthesized (**A**) CGmCGCG, (**B**) CGhmCGCG, (**C**) CGfCGCG and (**D**) CGcaCGCG. Calculated and found m/z value: (A) 902.18 and 902.40, (B) 910.18 and 910.44, (C) 909.17 and 909.34, (D) 917.17 and 917.36

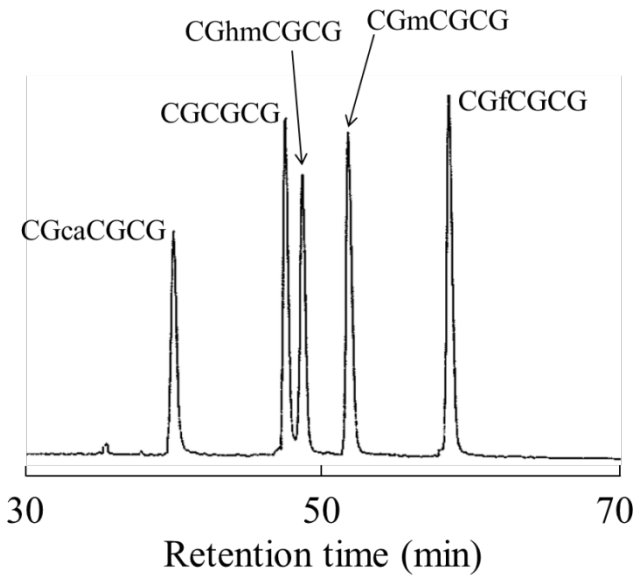

Fig. S3 HPLC analysis of synthesized CGCGCG, CGmCGCG, CGhmCGCG, CGfCGCG and CGcaCGCG. Elution was with 50 mM ammonium formate containing 0-7% acetonitrile in a linear gradient at a flow rate of 1.0 mL/min for 70 minutes, at 40 °C.

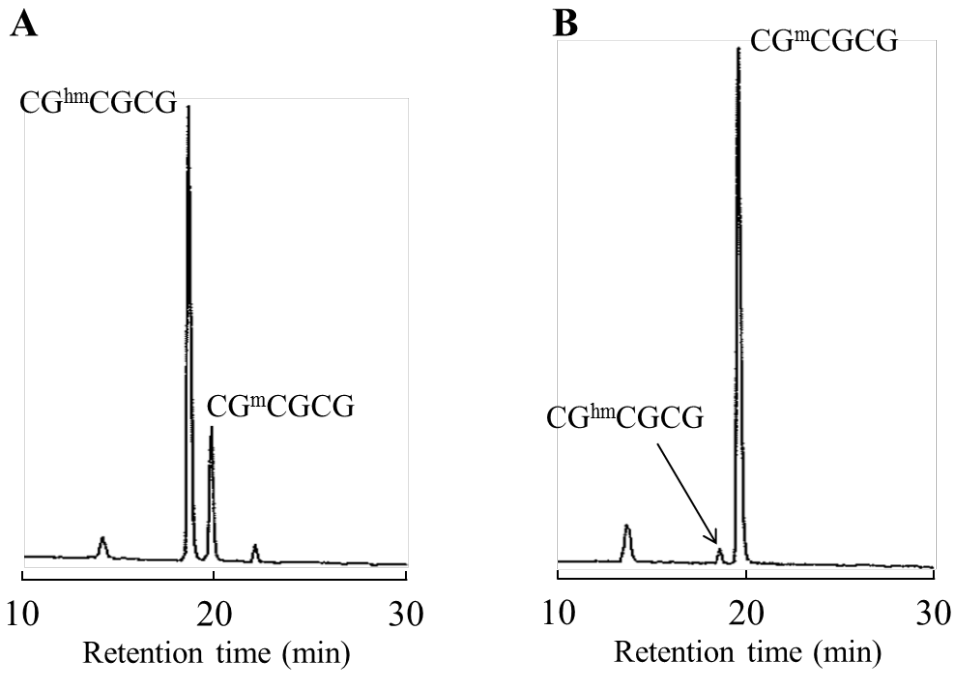

Fig. S4 Oxidation of CGmCGCG by mTet1 protein in the (**A**) presence or (**B**) absence of ATP. 55.4 μM of DNA and 729 nM mTet1 protein were incubated at 37 °C for 1 hour (total volume: 50 μL). After incubation, 3 μL of the reaction mixture was used for HPLC analysis. Elution was with 50 mM ammonium formate containing 0-9% acetonitrile in a linear gradient at a flow rate of 1.0 mL/min for 30 minutes, at 40 °C.

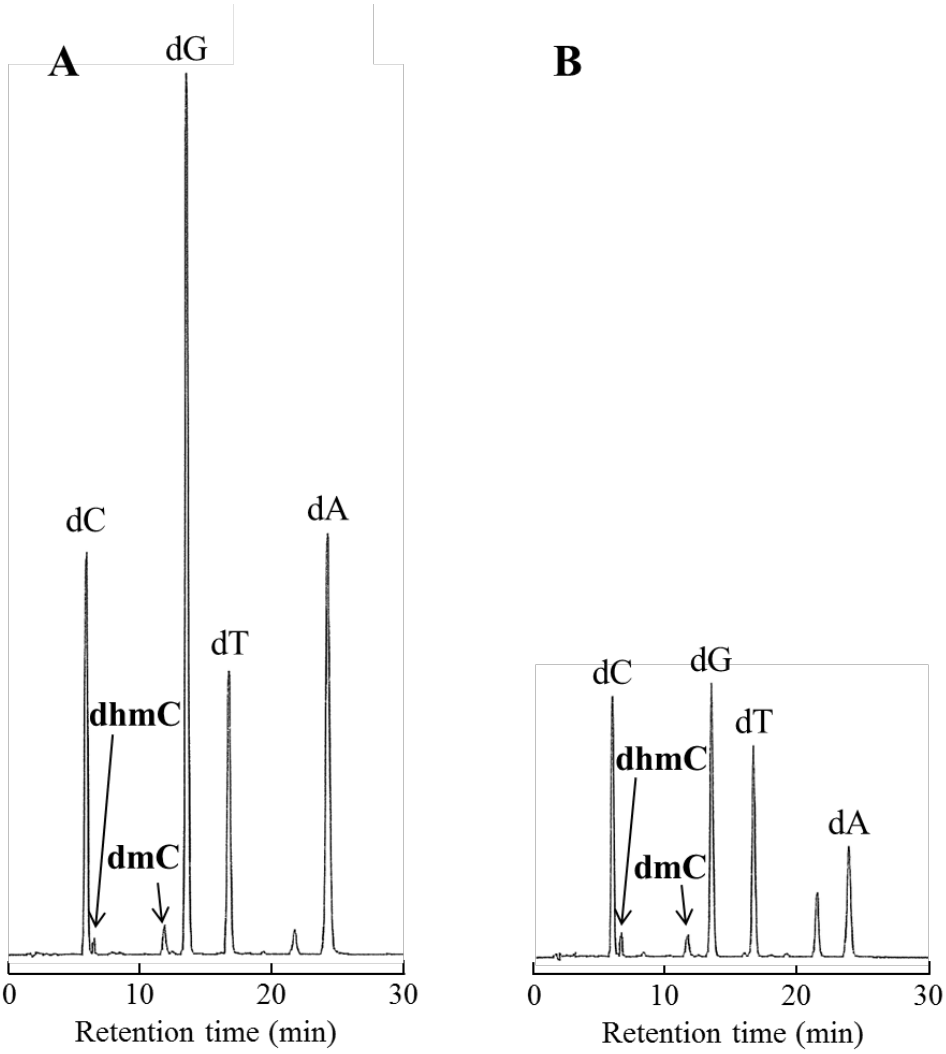

Fig. S5 Comparison of the reactivity of 20-mer DNA, 5'-TTTCAGCTCmCGGTCACGCTC-3' in the (**A**) presence or (**B**) absence of its complementary strand. 16.3 μM DNA and 729 nM mTet1 protein were mixed and incubated at 37 °C for 1 hour (total volume: 50 μL). After incubation, all of the reaction mixture was purified by QIAquick Nucleotide Removal Kit (Qiagen). Purified DNAs were digested with nuclease P_1 (Wako) and Antarctic phosphatase (New England Biolabs) at 37 °C for 4 hours. All of the reaction mixture was used for HPLC analysis. Elution was with 50 mM ammonium formate containing 0-3% acetonitrile in a linear gradient at a flow rate of 1.0 mL/min for 30 min, at 40 °C. Conversion was 27% and 41%, respectively.