
Supplementary information

**Template and target-site recognition by
human LINE-1 in retrotransposition**

In the format provided by the
authors and unedited

Supplementary Figure 1

Figure 1c

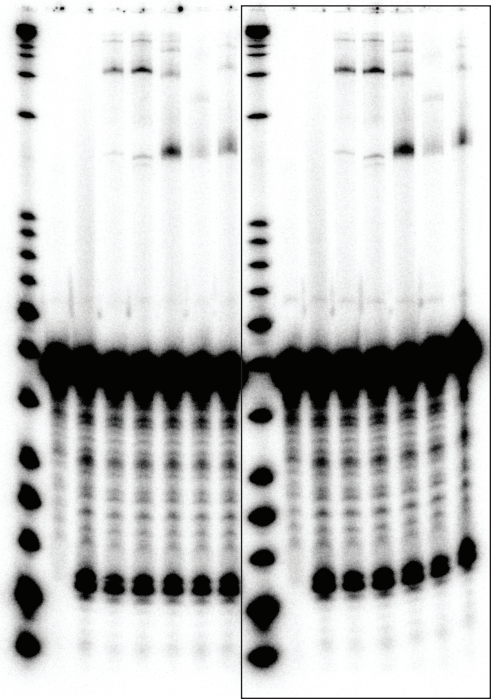


Figure 1d

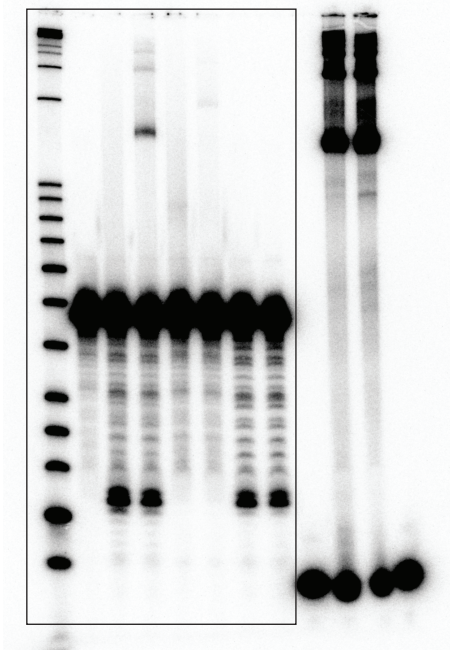


Figure 2c

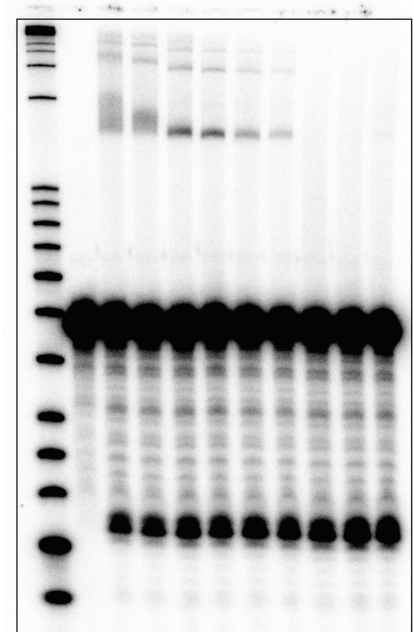


Figure 3d

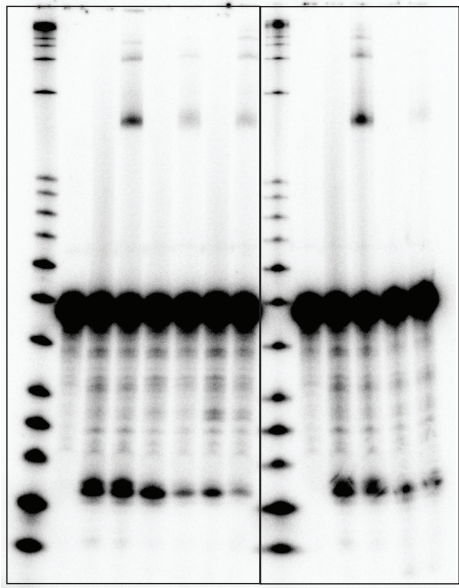


Figure 2g

Figure 3f

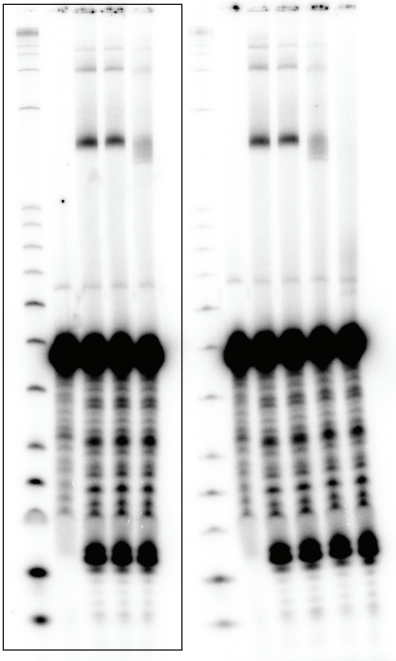
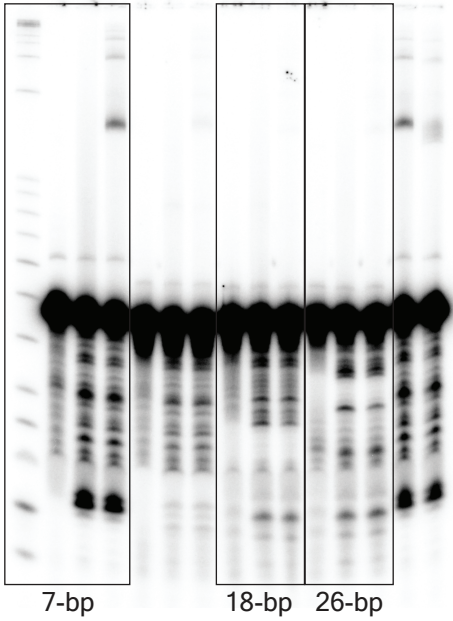


Figure 4b, Extended Data Fig 7a



7-bp

18-bp

26-bp

Supplementary Figure 1 (contd)

Figure 4c, , Extended Data Fig 7b

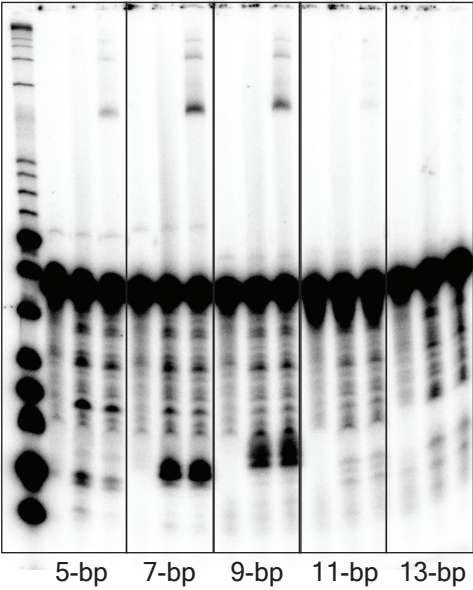


Figure 4d

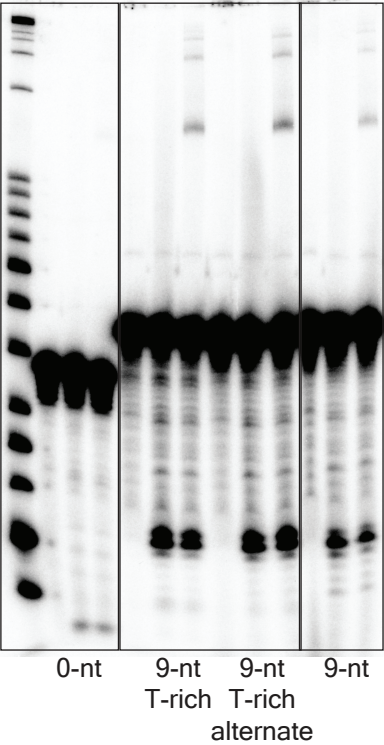
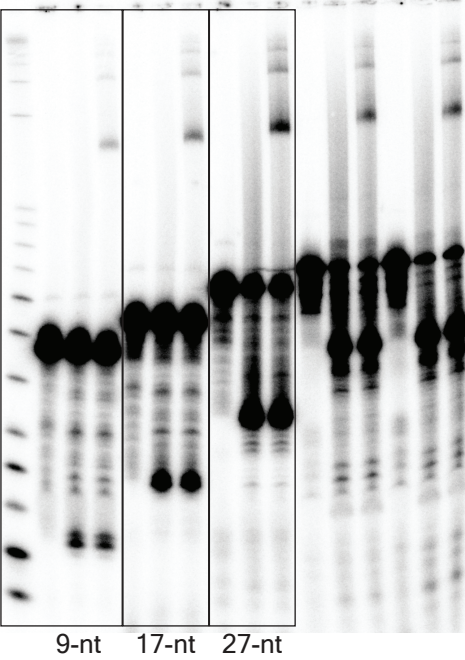
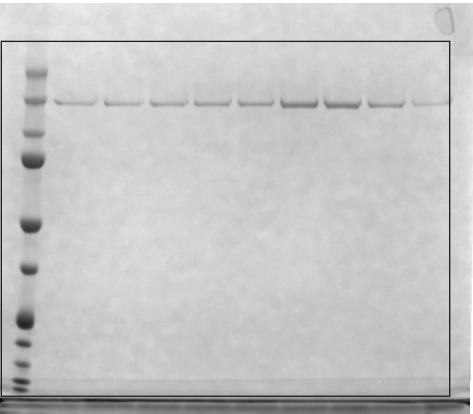


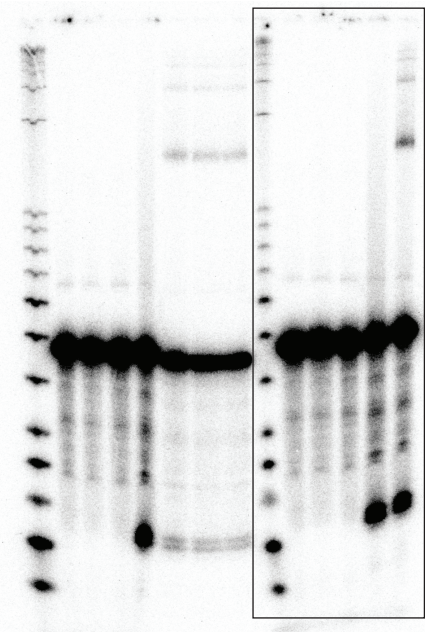
Figure 4e



Extended Data Fig 1a

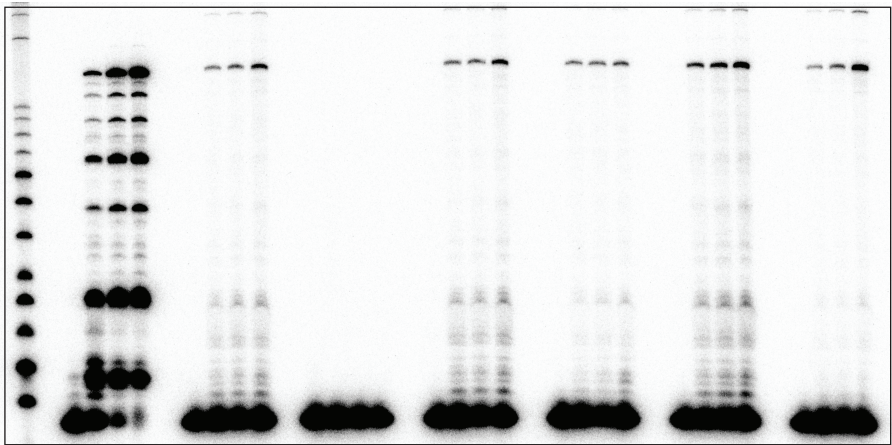


Extended Data Fig 1c

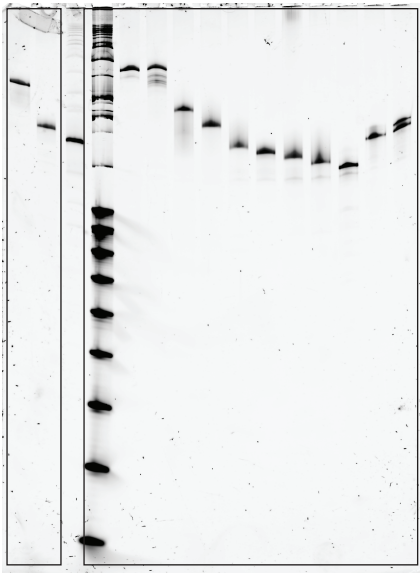


Supplementary Figure 1 (contd)

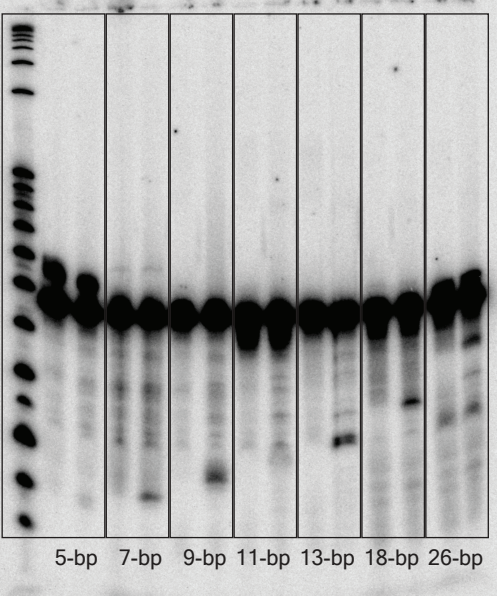
Extended Data Fig 1d



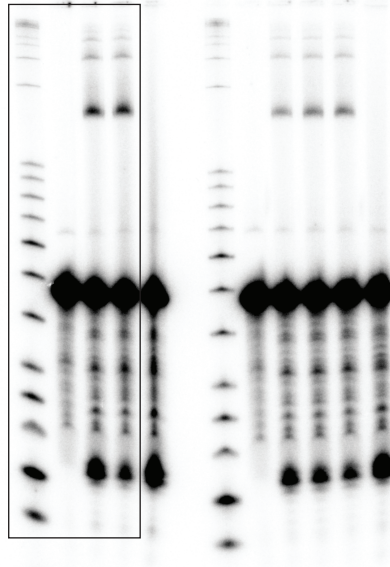
Extended Data Fig 5e



Extended Data Fig 8



Extended Data Fig 10b



Supplementary Table 1. Nucleic acids used in this study

Name	Sequence	Purpose and figure
RNA		
AluY SINE 25A (AY, 307nt)	GACCGGCCGGGCGCGGUGGCUCACGCCUGUAA UCCCAGCACUUUGGGAGGCCGAGGCGGGCGGA UCACGAGGUCAGGAGAUUCGAGACCAUCCCGGC UAAAACGGUGAAACCCCGUCUCUACUAAAAAU ACAAAAAAUAGCCGGGCGUAGUGGCGGGCGC CUGUAGUCCCAGCUACUUGGGAGGCUGAGGCA GGAGAAUGGCGUGAACCCGGGAGGCGGAGCUU GCAGUGAGCCGAGAUCCCGCCACUGCACUCCA GCCUGGGCGACAGAGCGAGACGUCUC AAAAAAAAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 1C
AluJ SINE 25A (AJ, 306nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCC AGCACUUUGGGAGGCCGAGGCGGGAGGAUUG CUUGAGCCCAGGAGUUCGAGACCAGCCUGGGC AACAUAGCGAGACCCCGUCUCUACAAAAAUAC AAAAAUAGCCGGGCGUGGUGGCGCGCGCCUG UAGUCCCAGCUACUCGGGAGGCUGAGGCAGGA GGAUCGCUUGAGCCCAGGAGUUCGAGGCUGCA GUGAGCUAUGAUCGCGCCACUGCACUCCGACC UGGGCGACAGAGCGAGACCCUGUCUC AAAAAAAAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 1C
AluJ half SINE 25A (AJh, 141nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCC AGCACUUUGGGAGGCCGAGGCGGGAGGAUUG CUUGAGCCCAGGAGUUCGAGACCAGCCUGGG CAACAUAGCGAGACCCCGUCUC AAAAAAAAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 1C-D, 2C, 2G, 3D, 3F, 4B-E
L1 3'UTR 25A (L1, 231nt)	GACAAUGAGAUACAUGGACACAGGAAGGGG AAUAUCACACUCUGGGGACUGUGGUGGGGU CGGGGGAGGGGGGAGGGGAUAGCAUUGGGAG AUUAUACCUAAUGCUAGAUGACACAUUAGUG GGUGCAGCGCACCAGCAUGGCACAUGUAUA CAUAUGUAACUAACCUGCACAAUGUGCACA UGUACCCUAAAACUUAGAGUAUAAU AAAAAAAAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 1C
L1 3'UTR Δ G-quadruplex 25A (L1 Δ , 149nt)	GAUAGCAUUGGGAGAUUAUACCUAAUGCUAGA UGACACAUUAGUGGGUGCAGCGCACCAGCAU GGCACAUGUAUACAUAUGUAACUAACCUGCA CAAUGUGCACAUGUACCCUAAAACUUAGAGU AUAUAUAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 1C
AluJ half SINE EM (AJh-EM, 141nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCC AGCACUUUGGGAGGCCGAGGCGGGAGGAUUG CUUGAGCCCAGGAGUUCGAGACCAGCCUGGG CAACAUAGCGAGACCCCGUCUC AAAAAAAAAAAAAAAAAAAAAAAAAAGC	Cryo-EM structure, Fig. 1E
Synthetic template RNA (74nt)	GCAGACUGCGUAGGCGUGCAGGAACCUGCACG CCUACGCAGUCUGCAAAAAAAAAAAAAAAAACAA UAUCGGCGCG	Cryo-EM structure, Fig. 1F
AluJ half SINE 75A (AJh 75A, 191nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCC AGCACUUUGGGAGGCCGAGGCGGGAGGAUUG CUUGAGCCCAGGAGUUCGAGACCAGCCUGGG CAACAUAGCGAGACCCCGUCUC AAAAAAAAAAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 2C

	AAAAAAAAAAAAAAAAAAAAAAAAA	
AluJ half SINE 50A (AJh 50A, 166nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCC AGCACUUUGGGAGGCCGAGGCGGGAGGAUUG CUUGAGCCCAGGAGUUCGAGACCAGCCUGGG CAACAUAGCGAGACCCCGUCUC AAAAAAAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 2C
AluJ half SINE 20A (AJh 20A, 136nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCC AGCACUUUGGGAGGCCGAGGCGGGAGGAUUG CUUGAGCCCAGGAGUUCGAGACCAGCCUGGG CAACAUAGCGAGACCCCGUCUC AAAAAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 2C
AluJ half SINE 15A (AJh 15A, 131nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCC AGCACUUUGGGAGGCCGAGGCGGGAGGAUUG CUUGAGCCCAGGAGUUCGAGACCAGCCUGGG CAACAUAGCGAGACCCCGUCUC AAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 2C
AluJ half SINE 10A (AJh 10A, 126nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCC AGCACUUUGGGAGGCCGAGGCGGGAGGAUUG CUUGAGCCCAGGAGUUCGAGACCAGCCUGGG CAACAUAGCGAGACCCCGUCUC AAAAAAAAAAAAA	TPRT assay, Fig. 2C
AluJ half SINE 5A (AJh 5A, 121nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCC AGCACUUUGGGAGGCCGAGGCGGGAGGAUUG CUUGAGCCCAGGAGUUCGAGACCAGCCUGGG CAACAUAGCGAGACCCCGUCUAAAAA	TPRT assay, Fig. 2C
AluJ half SINE 25N (AJh 25N, 141nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCCA GCACUUUGGGAGGCCGAGGCGGGAGGAUUGCUU GAGCCCAGGAGUUCGAGACCAGCCUGGGCAACA UAGCGAGACCCCGUCUCGGUAACGAGAACUGUC AUGCACCC	TPRT assay, Fig. 2C
AluJ half SINE 20N 5A (AJh 20N5A, 141nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCCA GCACUUUGGGAGGCCGAGGCGGGAGGAUUGCUU GAGCCCAGGAGUUCGAGACCAGCCUGGGCAACA UAGCGAGACCCCGUCUCGGUAACGAGAACUGUC AUGCAAAAA	TPRT assay, Fig. 2C
AluJ half SINE modified 25A (AJhm, 142nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCCA GCACUUUGGGAGGCCGAGGCGGGAGGAUUGCUU GAGCCCAGGAGUUCGAGACCAGCCUGGGCAACA UAGCGAUCCUCCCGUCUC AAAAAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 3F
AluJ half SINE unfolded 25A (AJh- uf, 141nt)	GGCCGGGCGCGGUGGCUCACGCCUGUAAUCCCA GCACUUUGGGAGGCCGAGGCGGGAGGAUUGCUU GAGCCCAGGAGUUCGAGACCAGCCUGGGCAACA UAACUAGACUGACAGAG AAAAAAAAAAAAAAAAAAAAAAAAA	TPRT assay, Fig. 3F
RT template RNA (129nt)	GGUAAUAGAACUGUCAUUAACCCCAAAAAUGAAGU AAUGGGUAAUAGAACUGUCAUUAACCCCAAAAAUC UAGUAAUGGGUAAUAGAACUGUCAUUAACCCCAAA AAUCUAGUAAUGCGCGACUGC	RT assay, ED Fig. 2
DNA		
Target site (7bp 5' of nick site, 9nt T-rich 5' overhang)	GCTTTTTTTCCTTTTAAAGGACGCATGATGCGGAAACA ATGCATCAC (top strand)	TPRT assay, Fig. 1C- D, 2C, 2G, 3D, 3F, 4B-E

	GTGATGCATTGTTTCCGCATCATGCGTCCTTAAAAAGG (bottom strand)	
Target site (5bp 5' of nick site, 9nt T-rich 5' overhang)	GCTTTTTTTTTTTTAAACCGACGCATGATGCGGAAACA ATGCATCAC (top strand) GTGATGCATTGTTTCCGCATCATGCGTCCGGTTAAAAA (bottom strand)	TPRT assay, Fig. 4C, Extended Data Fig. 7-8
Target site (9bp 5' of nick site, 9nt T-rich 5' overhang)	GCTTTTTTTCGGCTTTTTAAACGCATGATGCGGAAACA ATGCATCAC (top strand) GTGATGCATTGTTTCCGCATCATGCGTTTAAAAAGCCG (bottom strand)	TPRT assay, Fig. 4C, Extended Data Fig. 7-8
Target site (11bp 5' of nick site, 9nt T-rich 5' overhang)	GCTTTTTTTCGGACCTTTTTAAGCATGATGCGGAAACA ATGCATCAC (top strand) GTGATGCATTGTTTCCGCATCATGCTTAAAAAGGTCCG (bottom strand)	TPRT assay, Fig. 4C, C, Extended Data Fig. 7-8
Target site (13bp 5' of nick site, 9nt T-rich 5' overhang)	GCTTTTTTTCGGACGCCTTTTTAAATGATGCGGAAACA ATGCATCAC (top strand) GTGATGCATTGTTTCCGCATCATGCTTAAAAAGGTCCG (bottom strand)	TPRT assay, Fig. 4C, C, Extended Data Fig. 7-8
Target site (18bp 5' of nick site, 9nt T-rich 5' overhang)	GCTTTTTTTCGGACGCATGATCTTTTTAAGCGGAAACA ATGCATCAC (top strand) GTGATGCATTGTTTCCGCTTAAAAAGATCATGCGTCCG (bottom strand)	TPRT assay, Fig. 4B, Extended Data Fig. 7-8
Target site (26bp 5' of nick site, 9nt T-rich 5' overhang)	GCTTTTTTTCGGACGCATGATGCGGAAACCTTTTTAAA ATGCATCAC (top strand) GTGATGCATTTTAAAAAGGTTTCCGCATCATGCGTCCG (bottom strand)	TPRT assay, Fig. 4B, Extended Data Fig. 7-8
Target site (7bp 5' of nick site, 0nt 5' overhang)	CCTTTTTAAGGACGCATGATGCGGAAACAATGCATCA C (top strand) GTGATGCATTGTTTCCGCATCATGCGTCCTTAAAAAGG (bottom strand)	TPRT assay, Fig. 4D
Target site (7bp 5' of nick site, 9nt 5' overhang)	CGCGCCGAACCTTTTTAAGGACGCATGATGCGGAAAC AATGCATCAC (top strand) GTGATGCATTGTTTCCGCATCATGCGTCCTTAAAAAGG (bottom strand)	TPRT assay, Fig. 4D
Target site (7bp 5' of nick site, 9nt 5' overhang with alternative T-rich sequence lanes)	GCAGTTTTTCCTTTTTAAGGACGCATGATGCGGAAACA ATGCATCAC (top strand) GTGATGCATTGTTTCCGCATCATGCGTCCTTAAAAAGG (bottom strand)	TPRT assay, Fig. 4D final 3 lanes in panel
Target site (7bp 5' of nick site, 17nt 5' overhang)	CGCGCCGAGCTTTTTTTCCTTTTTAAGGACGCATGATG CGGAAACAATGCATCAC (top strand) GTGATGCATTGTTTCCGCATCATGCGTCCTTAAAAAGG (bottom strand)	TPRT assay, Fig. 4E
Target site (7bp 5' of nick site, 27nt 5' overhang)	ACGTCTCTATCGCGCCGAGCTTTTTTTCCTTTTTAAGGA CGCATGATGCGGAAACAATGCATCAC (top strand) GTGATGCATTGTTTCCGCATCATGCGTCCTTAAAAAGG (bottom strand)	TPRT assay, Fig. 4E
9nt RT assay primer	GCAGTCGCG	RT assay, ED Fig. 2
7nt EM primer for SINE RNA	GCTTTTT	Cryo-EM structure, Fig. 1E
8nt EM primer for synthetic template RNA	CGCGCCGA	Cryo-EM structure, Fig. 1F