Figure S1

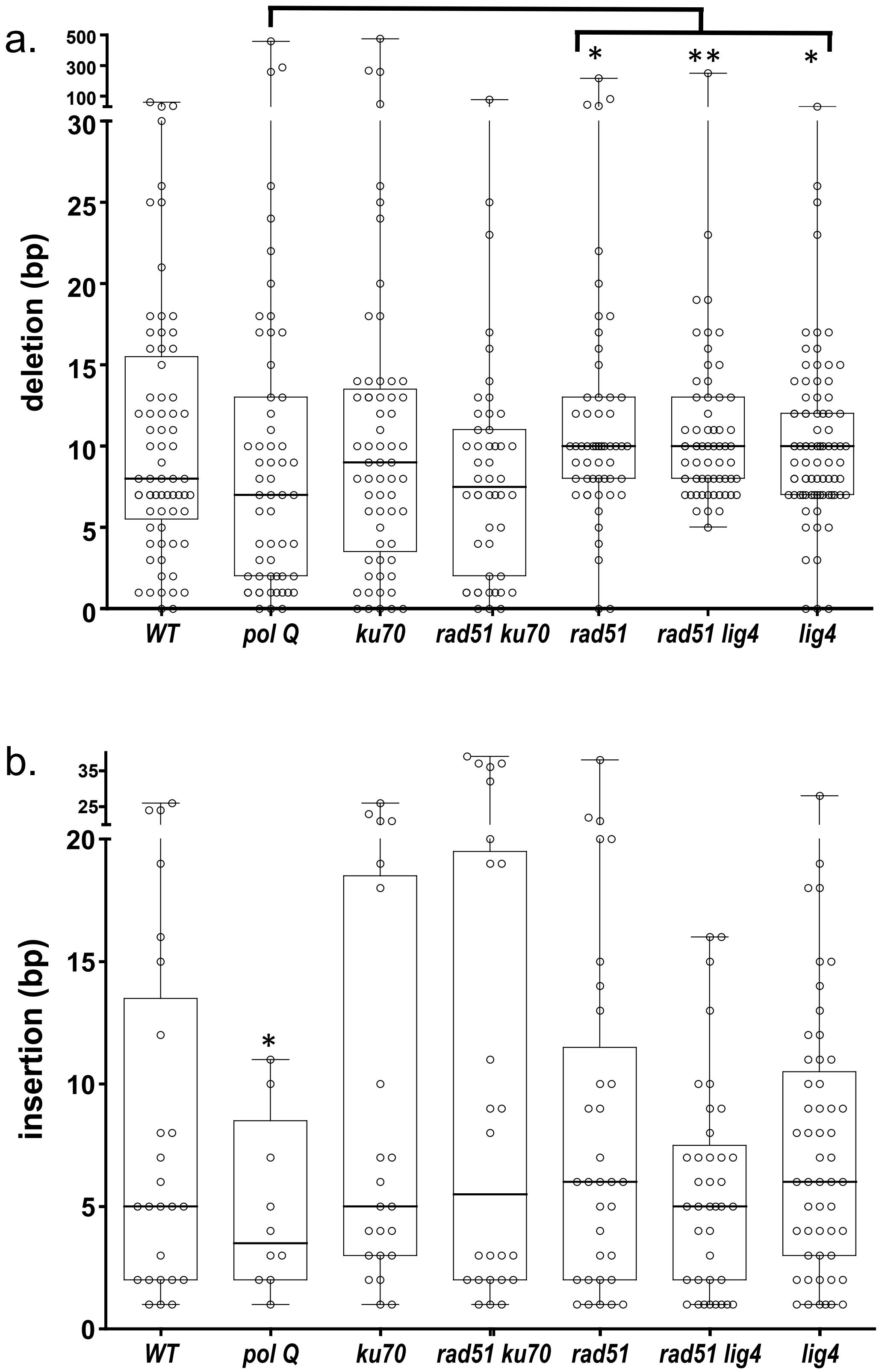
a.
500
300
100
30
25
20
15
10
5
0
deletion (bp)
*
**
*
WT
pol Q
ku70
rad51 ku70
rad51
rad51 lig4
lig4
b.
35
25
20
15
10
5
0
insertion (bp)
*
WT
pol Q
ku70
rad51 ku70
rad51
rad51 lig4
lig4

Figure S1. Size of deletions and insertions is not affected by C-NHEJ deficiency.
a. Box and whisker / scatter plots showing distribution of deletion sizes by genotype. Each circle represents one sequence. Bold horizontal lines indicate medians. The median deletion size in WT (8 bp) is not significantly different from the median net deletion in any other genotype assayed. The median deletion size in *polQ* mutants is significantly smaller than that in *rad51* (p=0.01), *rad51 lig4* (p<0.01), and *lig4* (p=0.02) flies (2-tailed Mann-Whitney test). This is consistent with *polQ* mutants less frequently resecting to repeats that could be used for SD-MMEJ. WT n=70; *pol Q* n=57; *ku70* n=62; *rad51 ku70* n=48; *rad51* n=55; *rad51 lig4* n=63; *lig4* n=83.
b. Box and whisker / scatter plot of sizes of net insertions at end-joining repair junctions by genotype. Bold horizontal lines indicate medians. Genetic background did not significantly affect median insertion length (p=0.7, Kruskal-Wallis test). Variance of insertion lengths is significantly decreased relative to wild-type in *polQ* mutants (p=0.05, Levene's Test).

Figure S2

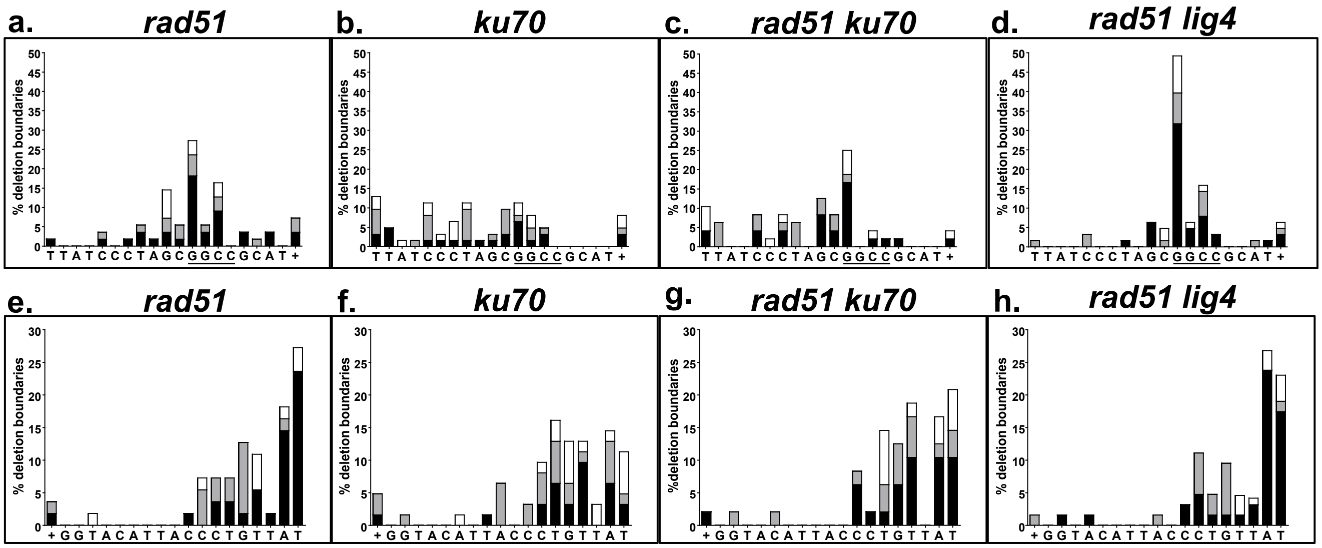

Figure S2. Combined effects of sequence context and genotype on deletion boundary frequency.

Histograms show right (a-d) and left (e-h) deletion boundaries in *rad51*, *ku70*, *rad51 ku70*, and *rad51 lig4* genetic backgrounds. Histograms show frequency, as percentage of total repair products, of deletion boundaries associated with net insertions (black), junctional microhomologies (gray) and apparent blunt joins (white). "Deletion boundary" is defined as the position (including junctional microhomologies, if any) at which an uninterrupted match between the original [Iw] sequence and the repair junction resumes. X axis indicates the top strand sequence. Deletions extending beyond the sequence depicted are represented by a plus sign (+).

Figure S3

Figure S3. Structure of indels formed by repair events includes characteristic patterns of short repeats present in the original sequence. Additional examples illustrating the patterns described in the caption to Figure 4. Sequences are (top to bottom) Supplemental Table S7 sequence 31; Supplemental Table S6 sequence 6; Supplemental Table 7 sequence 65; Supplemental Table S6 sequence 8.

Figure S4

a. **step 1)** CGGTACATTACCCTGTTAggcataGGCCGCATAGGCCACTA
step 2) CGGTACATTACCCTGTTAggcataGGCCGCATAGGCCACTA

b. **step 1)** TACATTACCCTGTTAgggtagtGGCCGCATAGGCCACTAGT
step 2) TACATTACCCTGTTAgggtagtGGCCGCATAGGCCACTAGT

c. **step 1)** TACATTACCCTGTTAacagggtaGGCCGCATAGGCCACTAG
step 2) TACATTACCCTGTTAacagggtaGGCCGCATAGGCCACTAG

d.
1)CGGTACATTACCCTGTacattacattacattacattacccggtacattatccaCTAGC(13bp)ACTAGTGGAT
2)CGGTACATTACCCTGTacattacattacattacattacccggtacattatccaCTAGC(13bp)ACTAGTGGAT
3)CGGTACATTACCCTGTacattacattacattacattacccggtacattatccaCTAGC(13bp)ACTAGTGGAT
4)CGGTACATTACCCTGTacattacattacattacattacccggtacattatccaCTAGC(13bp)ACTAGTGGAT
5)CGGTACATTACCCTGTacattacattacattacattacccggtacattatccaCTAGC(13bp)ACTAGTGGAT
6)CGGTACATTACCCTGTacattacattacattacattacccggtacattatccaCTAGC(13bp)ACTAGTGGAT
7)CGGTACATTACCCTGTacattacattacattacattacccggtacattatccaCTAGC(13bp)ACTAGTGGAT

e.
1)CATTACCCTGTTATaattataattataattattatagtGGCCGCATAGGCCACTAG
2)CATTACCCTGTTATaattataattataattattatagtGGCCGCATAGGCCACTAG
3)CATTACCCTGTTATaattataattataattattatagtGGCCGCATAGGCCACTAG
4)CATTACCCTGTTATaattataattataattattatagtGGCCGCATAGGCCACTAG
5)CATTACCCTGTTATaattataattataattattatagtGGCCGCATAGGCCACTAG
6)CATTACCCTGTTATaattataattataattattatagtGGCCGCATAGGCCACTAG

Figure S4. Repair product sequences consistent with multi-step SD-MMEJ. Repair by multi-step SD-MMEJ produces repair products that can be "dissected" into an uninterrupted series of overlapping direct and/or inverted repeats spanning the insertion and flanking sequence on both sides. Only top strands (3'-5') shown. Notational conventions as described in Figures 5 and 6.

a. SD-MMEJ by two sequential rounds of direct (loop-out) synthesis from the right side of the DSB. *Step 1:* Bottom strand at leftmost GGCC (red, underlined) anneals to the top strand at the right-hand GGCC (white on red). GCATA (white on red) templates synthesis resulting in 3'-CG... (bottom strand, not shown). *Step 2:* The 3' CG base-pairs with the leftmost GC in TAGGC (white on red). TAG (white on red) templates synthesis producing 3'-AT... (bottom strand, not shown) which anneals to the top strand TA on the other side of the DSB (red, underlined, capitalized). Sequence shown is sequence 113 in table S8.

b. SD-MMEJ repair via snap-back synthesis on each side of the DSB. *Step 1:* Terminal base A of the 3' end to the left of the DSB (blue, capitalized, underlined) anneals to T four bp to the left (white on blue). Primer extension and dissociation result in a single stranded 3' end with newly synthesized sequence gggta (blue, lowercase, underlined). *Step 2:* The 3' CCGG (complementary to blue underlined GGCC) snaps back and anneals to GGCC (white on blue). ACTA (white on blue) templates synthesis of 5'...TGAT-3' (bottom strand, not shown), which has two bp of microhomology to the 3' end produced in Step 1. Sequence shown is sequence 114 in table S8.

c. SD-MMEJ repair with snap-back synthesis on the left DSB end and and loop-out synthesis on the right. Sequence shown is sequence 11 in table S8.

d. Repair product with a long insertion consistent with repair by six Iterative rounds of loop-out SD-MMEJ on the right side of the DSB and a single round of snap-back synthesis on the left. Sequence shown is sequences 93 and 94 in table S8.

e. Repair product with a long insertion consistent with repair by five iterative rounds of snap-back SD-MMEJ on the left side of the DSB and one round of snap-back SD-MMEJ on the right. Self-complementarity of the insertion suggests that newly synthesized sequence was subsequently used as a template. Sequence shown is sequence 8 in table S8.

Figure S5

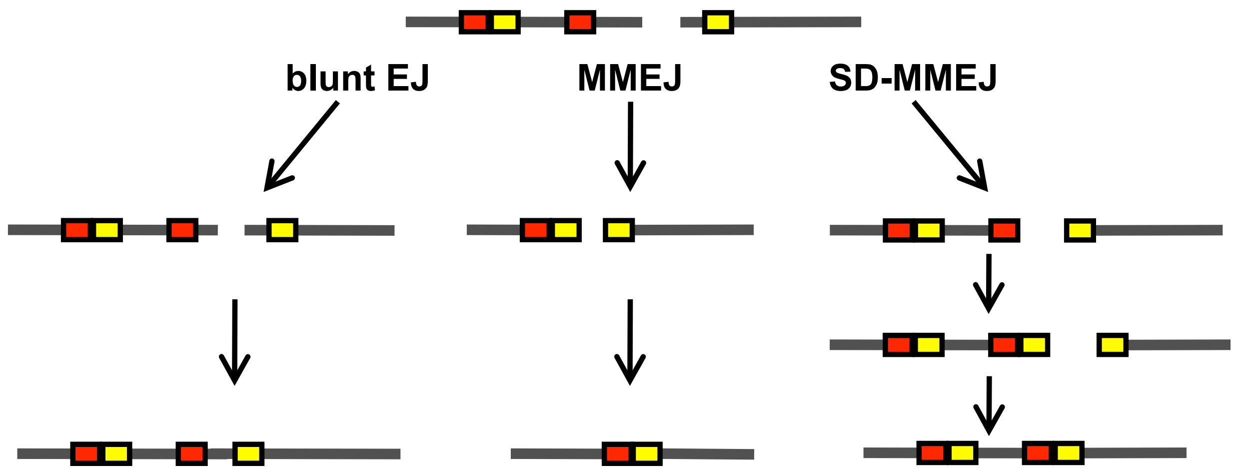

Figure S5. SD-MMEJ events without insertions can be distinguished from true blunt joins by repair product structure.
Deletions associated with true blunt joins (left) do not correlate with any short repeats present in the repair product and do not create longer repeats at the apparent point of ligation. SD-MMEJ events where the template for the newly synthesized microhomology is adjacent to the primer (right) do not produce net insertions, but do create a repeat where one instance of the repeated motif contains the point of ligation. Identically colored boxes represent direct repeats.

Figure S6

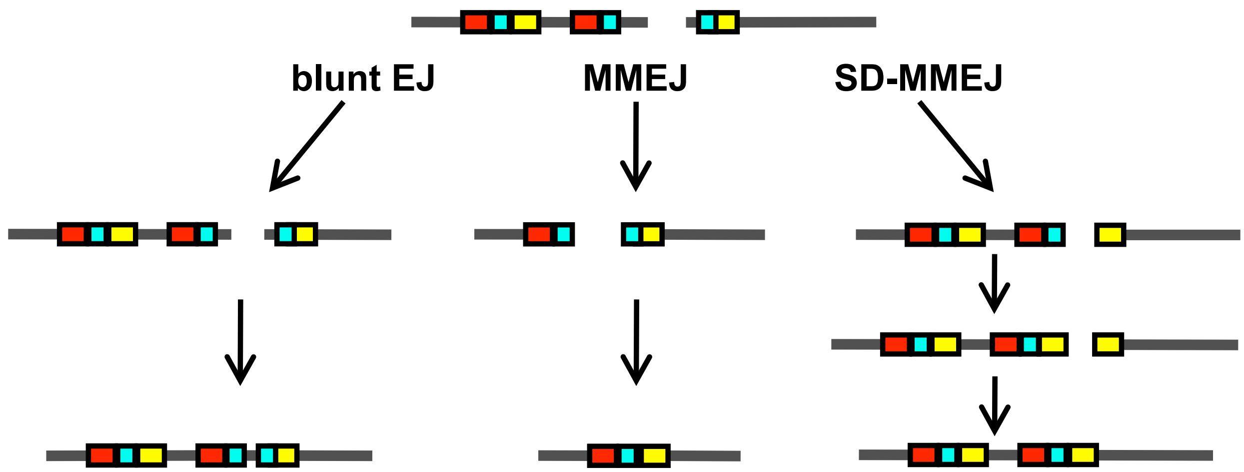

Figure S6. SD-MMEJ events can be distinguished from MMEJ at pre-existing microhomologies by repair product structure.
Deletions associated with true blunt joins (left) do not correlate with any short repeats present in the repair product and do not create longer repeats at the apparent point of ligation. MMEJ at pre-existing direct repeats (center) does not create a longer repeated motif. SD-MMEJ event (right) can create a junction that is locally indistinguishable from MMEJ at pre-existing microhomologies, but unlike MMEJ at pre-existing microhomologies, creates a longer repeated motif. Identically colored boxes represent direct repeats.

Table S1.

	mean (bp)	median (bp)
WT	1.8	2.0
polQ	1.9	2.0
ku70	2.0	2.0
rad51 ku70	1.6	1.0
rad51	1.8	1.0
rad51 lig4	2.1	2.0
lig4	1.9	1.0

Supplemental Table S1. Mean and median junctional microhomology lengths by genotype
Mean and median junctional microhomology length by genotype. Genetic background has no significant effect on either the mean (p=0.91, one-way ANOVA) or the median (p=0.85, Kruskal-Wallis test) junctional microhomology length.

Table S2.

original [lw] sequence	repair product
CCCTG|TTAT|CCCTAGCGGCCGCATAGGCCACT	ATTACCCT.G.GCCGCATAGGCCACT (19)[A]
CGGTACATTACCCTG|TTAT|CCCTAGCGGCCGCATA	AATTCGGTACATTA.CCCT.AGCGGC (15)[B]
TCGGTACATTACCCTG|TTAT|CCCTAGCGGCCG	AATTCGGTACATTAC.CC.GCATAGG (10)[D]
TACATTACCCTG|TTAT|CCCTAGCGGCCGCATA	ACATTACCCT.G.CGGCCGCATAGGC (9)[E]
TACATTACCCTG|TTAT|CCCTAGCGGCCGCATA	CGGTACATTACC.C.GGCCGCATAGG (7)
TCGGTACATTACCCTG|TTAT|CCCTAGCGGCCG	CCGAATTCGGTACATTA.CC.GCATA (6)[F]
TACATTACCCTG|TTAT|CCCTAGCGGCCGCATA	CGGTACA.TTA.TCCCTAGCGGCCGC (6)
TACATTACCCTG|TTAT|CCCTAGCGGCCGCATA	GTACATTACCC.T.TATCCCTAGCGG (4)[G]
TACATTACCCTG|TTAT|CCCTAGCGGCCGCATA	GGTACATTACCCT.G.CCGCATAGGC (4)
CGGTACATTACCCTG|TTAT|CCCTAGCGGCCGCATA	ATTCGGTACATTACCCTG.T.ATCCC (3)[H]
CATTACCCTG|TTAT|CCCTAGCGGCCGCATAGG	CCTGTTA.T.AGCGGCCGCATAGGCC (3)[I]
AGCCGAATTCGGTACATTACCCTG|TTAT|CCCTAGCGGC	AGCAGCCGAATT.CGG.CCGCATAGG (3)[J]

Supplemental Table S2. The SD-MMEJ model explains bias in frequency of specific junctional microhomologies.
The most frequently observed junctional microhomology (top row) is consistent with SD-MMEJ repair with a 4 bp direct/inverted repeat as a primer (Compare Figure 3a-c). Junctional microhomologies not consistent with SD-MMEJ are not highlighted. Number of times a sequence was independently recovered is indicated in parentheses. Positions of bottom and top strand nicks in the original sequence indicated by subscripted/superscripted vertical lines. Microhomologies are indicated in the original sequence as white on black with dotted underlines. Blue and red boxed/underlined repeated motifs are SD-MMEJ consistent. Lettered superscripts cross-reference Table S4.

Table S3.

	sequences of apparent blunt joins [–] indicates deleted sequence		genotype	deln (bp)
1[A1]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[1]	WT[1]	7
2[A2]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[2]	WT[2]	7
3[A3]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[3]	WT[3]	7
4[A4]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[4]	WT[4]	7
5[A5]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[5]	*ku70*[1]	7
6[A6]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[6]	*lig4*[1]	7
7[A7]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[7]	*rad51 ku70*[1]	7
8[A8]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[8]	*rad51 ku70*[2]	7
9[A9]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[9]	*rad51 lig4*[1]	7
10[A10]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[10]	*rad51 lig4*[2]	7
11[A11]	GCAGCCGAATTCGGTACATTACCCTGTTA**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[11]	*polQ*[1]	7
12[B1]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[12]	WT[5]	10
13[B2]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[13]	*rad51*[1]	10
14[B3]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[14]	*ku70*[2]	10
15[B4]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[15]	*lig4*[2]	10
16[B5]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[16]	*lig4*[3]	10
17[B6]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[17]	*lig4*[4]	10
18[B7]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[18]	*rad51 lig4*[3]	10
19[B8]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[19]	*rad51 lig4*[4]	10
20[B9]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[20]	*rad51 lig4*[5]	10
21[B10]	GCAGCAGCCGAATTCGGTACATTACCCTG**T**[–]***GGCC***GCATA***GGCCA***CTAGTGGATCTGGATC	I[21]	*polQ*[2]	10
22[C1]	AGCAGCCGAATTCGGTACA***TTACCC***TG***TTA***[–]**CCC**TAGCGGCCGCATAGGCCACTAGTGGAT	II[1]	WT[6]	1
23[C2]	AGCAGCCGAATTCGGTACA***TTACCC***TG***TTA***[–]**CCC**TAGCGGCCGCATAGGCCACTAGTGGAT	II[2]	WT[7]	1
24[C3]	AGCAGCCGAATTCGGTACA***TTACCC***TG***TTA***[–]**CCC**TAGCGGCCGCATAGGCCACTAGTGGAT	II[3]	*ku70*[3]	1
25[C4]	AGCAGCCGAATTCGGTACA***TTACCC***TG***TTA***[–]**CCC**TAGCGGCCGCATAGGCCACTAGTGGAT	II[4]	*polQ*[3]	1
26[D1]	AGCAGCCGAATTCGGTACATTACCCTGTT**A**[–]***GGCC***GCAT***AGGCC***ACTAGTGGATCTGGATC	I[22]	*lig4*[5]	8
27[D2]	AGCAGCCGAATTCGGTACATTACCCTGTT**A**[–]***GGCC***GCAT***AGGCC***ACTAGTGGATCTGGATC	I[23]	*rad51 ku70*[3]	8

28[D3]	AGCAGCCGAATTCGGTACATTACCCTGTTA-GGCCGCATAGGCCACTAGTGGATCTGGATC	I[24]	*rad51 lig4*[6]	8
29[E1]	GCAGCCGAATTCGGTACATTACCCTGTTAT-CCGCATAGGCCACTAGTGGATCTGGATCCT	-	*rad51*[2]	9
30[E2]	GCAGCCGAATTCGGTACATTACCCTGTTAT-CCGCATAGGCCACTAGTGGATCTGGATCCT	-	*lig4*[6]	9
31[E3]	GCAGCCGAATTCGGTACATTACCCTGTTAT-CCGCATAGGCCACTAGTGGATCTGGATCCT	-	*rad51 lig4*[7]	9
32[F1]	GCAGCCGAATTCGGTACATTACCCTGTTAT-GCGGCCGCATAGGCCACTAGTGGATCTGGA	III[1]	*rad51*[3]	5
33[F2]	GCAGCCGAATTCGGTACATTACCCTGTTAT-GCGGCCGCATAGGCCACTAGTGGATCTGGA	III[2]	*lig4*[7]	5
34[G1]	GCGTCGTTTAGAGCAGCAGCCGAATTCGGT-GGCCGCATAGGCCACTAGTGGATCTGGATC	I[25]	*rad51*[4]	22
35[G2]	GCGTCGTTTAGAGCAGCAGCCGAATTCGGT-GGCCGCATAGGCCACTAGTGGATCTGGATC	I[26]	*polQ*[4]	22
36[H1]	AGCAGCCGAATTCGGTACATTACCCTGTTA-CCGCATAGGCCACTAGTGGATCTGGATCCT	II[5]	*rad51*[5]	10
37[H2]	AGCAGCCGAATTCGGTACATTACCCTGTTA-CCGCATAGGCCACTAGTGGATCTGGATCCT	II[6]	*rad51 ku70*[4]	10
38[I]	GCAGCCGAATTCGGTACATTACCCTGTTAT-TAGCGGCCGCATAGGCCACTAGTGGATCTG	-	WT[8]	3
39[I2]	GCAGCCGAATTCGGTACATTACCCTGTTAT-TAGCGGCCGCATAGGCCACTAGTGGATCTG	-	*ku70*[4]	3
40[J1]	AGCAGCCGAATTCGGTACATTACCCTGTTA-CGGCCGCATAGGCCACTAGTGGATCTGGAT	II[7]	WT[9]	7
41[J2]	AGCAGCCGAATTCGGTACATTACCCTGTTA-CGGCCGCATAGGCCACTAGTGGATCTGGAT	II[8]	*rad51 lig4*[8]	7
42[K]	CAGCAGCCGAATTCGGTACATTACCCTGAT-CCACTAGTGGATCTGGATCCTCTAGAGTCG	-	*ku70*[5]	20
43[L]	TCGTTTAGAGCAGCAGCCGAATTCGGTACA-CTAGCGGCCGCATAGGCCACTAGTGGATCT	-	*ku70*[6]	14
44[M]	AGCAGCCGAATTCGGTACATTACCCTGTTA-CATAGGCCACTAGTGGATCTGGATCCTCTA	-	WT[10]	13
45[N]	AGCAGCCGAATTCGGTACATTACCCTGTTA-CCACTAGTGGATCTGGATCCTCTAGAGTCG	II[9]	*rad51 lig4*[9]	19
46[O]	ACCCTTACGTGGAATAAAAAAAAATGAAAT-GGCCGCATAGGCCACTAGTGGATCTGGATC	-	*polQ*[5]	459
47[P]	TGCGTCGTTTAGAGCAGCAGCCGAATTCGG-CCCTAGCGGCCGCATAGGCCACTAGTGGAT	-	WT[11]	16
48[Q]	AGCAGCCGAATTCGGTACATTACCCTGTTA-CTAGCGGCCGCATAGGCCACTAGTGGATCT	II[10]	WT[12]	3
49[S]	GCAGCCGAATTCGGTACATTACCCTGTTAT-CGGCCGCATAGGCCACTAGTGGATCTGGAT	-	*rad51 lig4*[10]	6
50[T]	GCAGCAGCCGAATTCGGTACATTACCCTGT-ACTAGTGGATCTGGATCCTCTAGAGTCGAC	-	*rad51 ku70*[5]	23
51[U]	TAGAGCAGCAGCCGAATTCGGTACATTACC-GCGGCCGCATAGGCCACTAGTGGATCTGGA	IV[1]	*rad51*[6]	12
52[V]	GCAGCCGAATTCGGTACATTACCCTGTTAT-GCCGCATAGGCCACTAGTGGATCTGGATCC	-	*rad51*[7]	8
53[W]	GCAGCAGCCGAATTCGGTACATTACCCTGT-GCGGCCGCATAGGCCACTAGTGGATCTGGA	III[3]	*rad51*[8]	8
54[X]	CAGCAGCCGAATTCGGTACATTACCCTGTT-GCGGCCGCATAGGCCACTAGTGGATCTGGA	III[4]	*polQ*[6]	7
55[Y]	GTTTAGAGCAGCAGCCGAATTCGGTACATT-GCGGCCGCATAGGCCACTAGTGGATCTGGA	-	WT[13]	15
56[Z]	AGCAGCAGCCGAATTCGGTACATTACCCTG-CCTAGCGGCCGCATAGGCCACTAGTGGATC	-	*ku70*[7]	5
57[AA]	GCAGCCGAATTCGGTACATTACCCTGTTAT-GCATAGGCCACTAGTGGATCTGGATCCTCT	-	WT[14]	11

58[AB]	AGCAGCAGCCGAATTCGGTACATTACCC**TG**–***GC***ATAG***GCCA***CTAGTGGATCTGGATCCTCT	-	***lig4***[8]	15
59[AC]	GCAGCCGAATTCGGTACATTACCCTGTT**AT**–***CCACTAGTGG*****AT**CTGGATCCTCTAGAGTCG	-	***ku70***[8]	18
60	GCAGCCGAATTCGGTACATTACCCTGTTAT–CCTAGCGGCCGCATAGGCCACTAGTGGATC	n/a	WT[15]	1
61	GCAGCCGAATTCGGTACATTACCCTGTTAT–CCTAGCGGCCGCATAGGCCACTAGTGGATC	n/a	WT[16]	1
62	GCAGCCGAATTCGGTACATTACCCTGTTAT–CCTAGCGGCCGCATAGGCCACTAGTGGATC	n/a	WT[17]	1
63	GCAGCCGAATTCGGTACATTACCCTGTTAT–CTAGCGGCCGCATAGGCCACTAGTGGATCT	n/a	WT[18]	2
64	AGCAGCAGCCGAATTCGGTACATTACCCTG–CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	WT[19]	4
65	AGCAGCAGCCGAATTCGGTACATTACCCTG–CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	WT[20]	4
66	AGCAGCAGCCGAATTCGGTACATTACCCTG–CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	WT[21]	4
67	GAGCAGCAGCCGAATTCGGTACATTACCCT–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*ku70*[9]	1
68	GAGCAGCAGCCGAATTCGGTACATTACCCT–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*ku70*[10]	1
69	AGCAGCAGCCGAATTCGGTACATTACCCTG–ATCCCTAGCGGCCGCATAGGCCACTAGTGG	n/a	*ku70*[11]	2
70	GCAGCCGAATTCGGTACATTACCCTGTTAT–CTAGCGGCCGCATAGGCCACTAGTGGATCT	n/a	*ku70*[12]	2
71	AGCAGCAGCCGAATTCGGTACATTACCCTG–CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	*ku70*[13]	4
72	AGCAGCAGCCGAATTCGGTACATTACCCTG–CTAGCGGCCGCATAGGCCACTAGTGGATCT	n/a	*ku70*[14]	6
73	CAGCAGCCGAATTCGGTACATTACCCTGTT–GCCGCATAGGCCACTAGTGGATCTGGATCC	n/a	*ku70*[15]	10
74	AGAGCAGCAGCCGAATTCGGTACATTACCC–GCCGCATAGGCCACTAGTGGATCTGGATCC	n/a	*ku70*[16]	14
75	GCAGCCGAATTCGGTACATTACCCTGTTAT–ATAGGCCACTAGTGGATCTGGATCCTCTAG	n/a	*lig4*[9]	13
76	TGCGTCGTTTAGAGCAGCAGCCGAATTCGG–GGCCGCATAGGCCACTAGTGGATCTGGATC	n/a	*lig4*[10]	23
77	GAGCAGCAGCCGAATTCGGTACATTACCCT–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*rad51 ku70*[6]	1
78	GAGCAGCAGCCGAATTCGGTACATTACCCT–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*rad51 ku70*[7]	1
79	GAGCAGCAGCCGAATTCGGTACATTACCCT–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*rad51 ku70*[8]	1
80	GCAGCCGAATTCGGTACATTACCCTGTTAT–CCTAGCGGCCGCATAGGCCACTAGTGGATC	n/a	*rad51 ku70*[9]	1
81	GCAGCCGAATTCGGTACATTACCCTGTTAT–CTAGCGGCCGCATAGGCCACTAGTGGATCT	n/a	*rad51 ku70*[10]	2
82	CAGCAGCCGAATTCGGTACATTACCCTGTT–GCCGCATAGGCCACTAGTGGATCTGGATCC	n/a	*rad51 lig4*[11]	10
83	GAGCAGCAGCCGAATTCGGTACATTACCCT–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*polQ*[7]	1
84	GAGCAGCAGCCGAATTCGGTACATTACCCT–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*polQ*[8]	1
85	GAGCAGCAGCCGAATTCGGTACATTACCCT–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*polQ*[9]	1
86	GAGCAGCAGCCGAATTCGGTACATTACCCT–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*polQ*[10]	1
87	CAGCAGCCGAATTCGGTACATTACCCTGTT–TCCCTAGCGGCCGCATAGGCCACTAGTGGA	n/a	*polQ*[11]	1

88	GCAGCCGAATTCGGTACATTACCCTGTTAT–CCTAGCGGCCGCATAGGCCACTAGTGGATC	n/a	*polQ*[12]	1
89	GCAGCCGAATTCGGTACATTACCCTGTTAT–CCTAGCGGCCGCATAGGCCACTAGTGGATC	n/a	*polQ*[13]	1
90	GCAGCCGAATTCGGTACATTACCCTGTTAT–CCTAGCGGCCGCATAGGCCACTAGTGGATC	n/a	*polQ*[14]	1
91	GCAGCCGAATTCGGTACATTACCCTGTTAT–CTAGCGGCCGCATAGGCCACTAGTGGATCT	n/a	*polQ*[15]	2
92	GCAGCCGAATTCGGTACATTACCCTGTTAT–CTAGCGGCCGCATAGGCCACTAGTGGATCT	n/a	*polQ*[16]	2
93	GCAGCCGAATTCGGTACATTACCCTGTTAT–CTAGCGGCCGCATAGGCCACTAGTGGATCT	n/a	*polQ*[17]	2
94	TAGAGCAGCAGCCGAATTCGGTACATTACC–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*polQ*[18]	3
95	TAGAGCAGCAGCCGAATTCGGTACATTACC–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*polQ*[19]	3
96	AGCAGCAGCCGAATTCGGTACATTACCCTG–CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	*polQ*[20]	4
97	AGCAGCAGCCGAATTCGGTACATTACCCTG–CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	*polQ*[21]	4
98	AGCAGCAGCCGAATTCGGTACATTACCCTG–CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	*polQ*[22]	4
99	AGCAGCAGCCGAATTCGGTACATTACCCTG–CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	*polQ*[23]	4
100	TTAGAGCAGCAGCCGAATTCGGTACATTAC–GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*polQ*[24]	13
101	TGGAGTACGAAATGCGTCGTTTAGAGCAGC–TTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*polQ*[25]	24

Table S3. Sequences of apparent blunt joins. Sequences and genotypes of all repair products with apparent blunt joins (n=101). Deleted bases not shown. Boxed dashes indicate apparent point of ligation (box notation indicates a possible insertion of length zero in SD-MMEJ consistent sequences) . Identical SD-MMEJ consistent sequences are indicated by a lettered superscript on the sequence number; letters cross-reference Table 1. SD-MMEJ consistent repeats are underlined. Predicted SD-MMEJ primer repeats in italics. Primer repeat groups as in Table 1 are indicated by Roman numerals and enumerated in superscripts. 59/101 (58.4%) of sequences are SD-MMEJ consistent (direct or inverted repeat of at least 4 bp within ± 20 bp of the junction). This proportion is significantly greater than would be predicted by random chance ($p<0.05$ Fisher's Exact Test). Expected proportion of SD-MMEJ consistent blunt joins was estimated by Monte Carlo simulation of random deletion events (See Materials and Methods). Number of sequences of a given genotype enumerated in superscripts. 30 bp on either side of the junction are shown. n/a: not applicable.

Table S4.

	sequence of repair products with junctional microhomology [.]nnn[.] indicates microhomology		genotype	del (bp)
1[A1]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[1]	WT[1]	12
2[A2]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[2]	WT[2]	12
3[A3]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[3]	WT[3]	12
4[A4]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[4]	*rad51*[1]	12
5[A5]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[5]	*rad51*[2]	12
6[A6]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[6]	*rad51*[3]	12
7[A7]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[7]	*lig4*[1]	12
8[A8]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[8]	*lig4*[2]	12
9[A9]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[9]	*lig4*[3]	12
10[A10]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[10]	*lig4*[4]	12
11[A11]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[11]	*lig4*[5]	12
12[A12]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[12]	*lig4*[6]	12
13[A13]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[13]	*lig4*[7]	12
14[A14]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[14]	*rad51 ku70*[1]	12
15 [A15]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[15]	*rad51 lig4*[1]	12
16[A16]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[16]	*rad51 lig4*[2]	12
17[A17]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[17]	*rad51 lig4*[3]	12
18[A18]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[18]	*rad51 lig4*[4]	12
19[A19]	GAGCAGCAGCCGAATTCGGTACATTACCC***T***[.]***G***[.]***GCC***GCATA***GGCCA***CTAGTGGATCTGGATCC	I[19]	*rad51 lig4*[5]	12
20 [B1]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[1]	WT[4]	9
21[B2]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[2]	*rad51*[4]	9
22[B3]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[3]	*ku70*[1]	9
23[B4]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[4]	*ku70*[2]	9
24[B5]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[5]	*ku70*[3]	9
25[B6]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[6]	*lig4*[8]	9
26[B7]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[7]	*lig4*[9]	9
27[B8]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[8]	*lig4*[10]	9
28[B9]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[9]	*rad51 ku70*[2]	9
29[B10]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[10]	*rad51 ku70*[3]	9
30[B11]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[11]	*rad51 lig4*[6]	9
31[B12]	TTTAGAGCAGCAGCCGAATTC***GGTA***CAT***TA***[.]***CC***CT[.]AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[12]	*rad51 lig4*[7]	9

32[B13]	TTTAGAGCAGCAGCCGAATTC**GGTA**CAT**TA.CC**CT.AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[13]	*polQ*[1]	9
33[B14]	TTTAGAGCAGCAGCCGAATTC**GGTA**CAT**TA.CC**CT.AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[14]	*polQ*[2]	9
34[B15]	TTTAGAGCAGCAGCCGAATTC**GGTA**CAT**TA.CC**CT.AGCGGCCGCATAGGCCACTAGTGGATCTGG	IV[15]	*polQ*[3]	9
35[D1]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[16]	WT[5]	17
36[D2]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[17]	WT[6]	17
37[D3]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[18]	WT[7]	17
38[D4]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[19]	*lig4*[11]	17
39[D5]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[20]	*lig4*[12]	17
40[D6]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[21]	*rad51 lig4*[8]	17
41[D7]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[22]	*rad51 lig4*[9]	17
42[D8]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[23]	*rad51 lig4*[10]	17
43[D9]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[24]	*polQ*[4]	17
44[D10]	TTAGAGCAGCAGCCGAATTC**GGTA**CAT**TAC.C**C.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[25]	*polQ*[5]	17
45[E1]	GAGCAGCAGCCGAATTCGGTACATTACCC**T.G.CGGCCGCA**TAGGCCACTAGTGGATCTGGAT	III[1]	WT[8]	10
46[E2]	GAGCAGCAGCCGAATTCGGTACATTACCC**T.G.CGGCCGCA**TAGGCCACTAGTGGATCTGGAT	III[2]	*rad51*[5]	10
47[E3]	GAGCAGCAGCCGAATTCGGTACATTACCC**T.G.CGGCCGCA**TAGGCCACTAGTGGATCTGGAT	III[3]	*rad51*[6]	10
48[E4]	GAGCAGCAGCCGAATTCGGTACATTACCC**T.G.CGGCCGCA**TAGGCCACTAGTGGATCTGGAT	III[4]	*ku70*[4]	10
49[E5]	GAGCAGCAGCCGAATTCGGTACATTACCC**T.G.CGGCCGCA**TAGGCCACTAGTGGATCTGGAT	III[5]	*lig4*[13]	10
50[E6]	GAGCAGCAGCCGAATTCGGTACATTACCC**T.G.CGGCCGCA**TAGGCCACTAGTGGATCTGGAT	III[6]	*rad51 ku70*[4]	10
51[E7]	GAGCAGCAGCCGAATTCGGTACATTACCC**T.G.CGGCCGCA**TAGGCCACTAGTGGATCTGGAT	III[7]	*rad51 ku70*[5]	10
52[E8]	GAGCAGCAGCCGAATTCGGTACATTACCC**T.G.CGGCCGCA**TAGGCCACTAGTGGATCTGGAT	III[8]	*polQ*[6]	10
53[E9]	GAGCAGCAGCCGAATTCGGTACATTACCC**T.G.CGGCCGCA**TAGGCCACTAGTGGATCTGGAT	III[9]	*polQ*[7]	10
54[Z1]	TAGAGCAGCA**GCCG**AATTCGGTACATTACC.**C.GGC**CGCATAGGCCACTAGTGGATCTGGATC	-	*rad51*[7]	13
55[Z2]	TAGAGCAGCA**GCCG**AATTCGGTACATTACC.**C.GGC**CGCATAGGCCACTAGTGGATCTGGATC	-	*rad51*[8]	13
56[Z3]	TAGAGCAGCA**GCCG**AATTCGGTACATTACC.**C.GGC**CGCATAGGCCACTAGTGGATCTGGATC	-	*ku70*[5]	13
57[Z4]	TAGAGCAGCA**GCCG**AATTCGGTACATTACC.**C.GGC**CGCATAGGCCACTAGTGGATCTGGATC	-	*ku70*[6]	13
58[Z5]	TAGAGCAGCA**GCCG**AATTCGGTACATTACC.**C.GGC**CGCATAGGCCACTAGTGGATCTGGATC	-	*ku70*[7]	13
59[Z6]	TAGAGCAGCA**GCCG**AATTCGGTACATTACC.**C.GGC**CGCATAGGCCACTAGTGGATCTGGATC	-	*rad51 lig4*[11]	13
60[Z7]	TAGAGCAGCA**GCCG**AATTCGGTACATTACC.**C.GGC**CGCATAGGCCACTAGTGGATCTGGATC	-	*polQ*[8]	13
61[F1]	TTTAGAGCAGCAGCCGAATT**CGGTA**CAT**TA.CC.G**CATAGGCCACTAGTGGATCTGGATCCTCT	IV[26]	WT[9]	18
62[F2]	TTTAGAGCAGCAGCCGAATT**CGGTA**CAT**TA.CC.G**CATAGGCCACTAGTGGATCTGGATCCTCT	IV[27]	WT[10]	18
63[F3]	TTTAGAGCAGCAGCCGAATT**CGGTA**CAT**TA.CC.G**CATAGGCCACTAGTGGATCTGGATCCTCT	IV[28]	*rad51*[9]	18
64[F4]	TTTAGAGCAGCAGCCGAATT**CGGTA**CAT**TA.CC.G**CATAGGCCACTAGTGGATCTGGATCCTCT	IV[29]	*rad51*[10]	18
65[F5]	TTTAGAGCAGCAGCCGAATT**CGGTA**CAT**TA.CC.G**CATAGGCCACTAGTGGATCTGGATCCTCT	IV[30]	*ku70*[8]	18

66[F6]	TTTAGAGCAGCAGCCGAATTCGGTACATTA□.CC□.GCATAGGCCACTAGTGGATCTGGATCCTCT	IV[31]	*polQ*[9]	18
67[G1]	AGAGCAGCAGCCGAATTCGGTACATTACCC□.T□.TATCCCTAGCGGCCGCATAGGCCACTAGTG	-	WT[11]	2
68[G2]	AGAGCAGCAGCCGAATTCGGTACATTACCC□.T□.TATCCCTAGCGGCCGCATAGGCCACTAGTG	-	*ku70*[9]	2
69[G3]	AGAGCAGCAGCCGAATTCGGTACATTACCC□.T□.TATCCCTAGCGGCCGCATAGGCCACTAGTG	-	*polQ*[10]	2
70[G4]	AGAGCAGCAGCCGAATTCGGTACATTACCC□.T□.TATCCCTAGCGGCCGCATAGGCCACTAGTG	-	*polQ*[11]	2
71[H1]	AGCAGCAGCCGAATTCGGTACATTACCCTG□.T□.ATCCCTAGCGGCCGCATAGGCCACTAGTGG	-	*rad51 ku70*[6]	1
72[H2]	AGCAGCAGCCGAATTCGGTACATTACCCTG□.T□.ATCCCTAGCGGCCGCATAGGCCACTAGTGG	-	*rad51 ku70*[7]	1
73[H3]	AGCAGCAGCCGAATTCGGTACATTACCCTG□.T□.ATCCCTAGCGGCCGCATAGGCCACTAGTGG	-	*rad51 ku70*[8]	1
74[I1]	AGCAGCCGAATTCGGTACATTACCCTGTTA□.T□.AGCGGCCGCATAGGCCACTAGTGGATCTGG	-	*ku70*[10]	4
75[I2]	AGCAGCCGAATTCGGTACATTACCCTGTTA□.T□.AGCGGCCGCATAGGCCACTAGTGGATCTGG	-	*rad51 ku70*[9]	4
76[I3]	AGCAGCCGAATTCGGTACATTACCCTGTTA□.T□.AGCGGCCGCATAGGCCACTAGTGGATCTGG	-	*rad51 ku70*[10]	4
77[J1]	AAATGCGTCGTTTAGAGCAGCAGCCGAATT□.CGG□.CCGCATAGGCCACTAGTGGATCTGGATCCT	-	WT[12]	25
78[J2]	AAATGCGTCGTTTAGAGCAGCAGCCGAATT□.CGG□.CCGCATAGGCCACTAGTGGATCTGGATCCT	-	*lig4*[14]	25
79[J3]	AAATGCGTCGTTTAGAGCAGCAGCCGAATT□.CGG□.CCGCATAGGCCACTAGTGGATCTGGATCCT	-	*rad51 ku70*[11]	25
80[L1]	TTAGAGCAGCAGCCGAATTCGGTACATTAC□.C□.GGCCGCATAGGCCACTAGTGGATCTGGATC	IV[32]	*ku70*[11]	14
81[L2]	TTAGAGCAGCAGCCGAATTCGGTACATTAC□.C□.GGCCGCATAGGCCACTAGTGGATCTGGATC	IV[33]	*rad51 ku70*[12]	14
82[M1]	AGCAGCAGCCGAATTCGGTACATTACCCTG□.T□.AGCGGCCGCATAGGCCACTAGTGGATCTGG	-	WT[13]	7
83[M2]	AGCAGCAGCCGAATTCGGTACATTACCCTG□.T□.AGCGGCCGCATAGGCCACTAGTGGATCTGG	-	*polQ*[12]	7
84[N1]	AGAGCAGCAGCCGAATTCGGTACATTACCC□.TG□.GATCTGGATCCTCTAGAGTCGACCTCGAAC	-	WT[14]	31
85[O1]	CGTCGTTTAGAGCAGCAGCCGAATTCGGTA□.C□.TAGCGGCCGCATAGGCCACTAGTGGATCTG	-	*rad51 ku70*[13]	16
86[P1]	ATGCGTCGTTTAGAGCAGCAGCCGAATTCG□.G□.GCCGCATAGGCCACTAGTGGATCTGGATCC	-	*ku70*[12]	24
87[R1]	TTAGAGCAGCAGCCGAATTCGGTACATTAC□.C□.ATAGGCCACTAGTGGATCTGGATCCTCTAG	IV[34]	*rad51*[11]	20
88[S1]	GAGTACGAAATGCGTCGTTTAGAGCAGCAG□.CC□.CTAGCGCCGCATAGGCCACTAGTGGATCTG	-	*ku70*[13]	26
89[T1]	TTAGAGCAGCAGCCGAATTCGGTACATTAC□.CC□.ACTAGTGGATCTGGATCCTCTAGAGTCGAC	-	WT[15]	26
90[U1]	GGAGTACGAAATGCGTCGTTTAGAGCAGCC□.AGC□.GGCCGCATAGGCCACTAGTGGATCTGGATC	-	WT[16]	35
91[V1]	TTAGAGCAGCAGCCGAATTCGGTACATTAC□.CCT□.CTAGAGTCGACCTCGAACGTTAACGTTAAC	-	*rad51*[12]	44
92[W1]	GCGTCGTTTAGAGCAGCAGCCGAAATGCGT□.C□.ACTAGTGGATCTGGATCCTCTAGAGTCGAC	-	WT[17]	60
93[X1]	ATTCGCAGTGGAAGGCTGCACCTGCAAAAG□.G□.GGCCGCATAGGCCACTAGTGGATCTGGATC	-	*polQ*[13]	288
94[Y1]	GAAAATTGTGGGAGCAGAGCCTTGGGTGCA□.GCC□.GCATAGGCCACTAGTGGATCTGGATCCTCT	-	*ku70*[14]	259
95	GAGCAGCAGCCGAATTCGGTACATTACCCT□.G□.CCGCATAGGCCACTAGTGGATCTGGATCCT	n/a	WT[18]	13
96	GAGCAGCAGCCGAATTCGGTACATTACCCT□.G□.CATAGGCCACTAGTGGATCTGGATCCTCTA	n/a	WT[19]	16
97	CGTTTAGAGCAGCAGCCGAATTCGGTACAT□.TA□.GGCCACTAGTGGATCTGGATCCTCTAGAGT	n/a	WT[20]	25
98	CAGCAGCCGAATTCGGTACATTACCCTGTT□.AT□.CTGGATCCTCTAGAGTCGACCTCGAACGTT	n/a	WT[21]	30
99	GTCGTTTAGAGCAGCAGCCGAATTCGGTAC□.AT□.CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	WT[22]	11

100	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	WT[23]	6
101	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	WT[24]	6
102	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*rad51*[13]	6
103	GGAGTACGAAATGCGTCGTTTAGAGCAGCA.GCCG.CATAGGCCACTAGTGGATCTGGATCCTCTA	n/a	*rad51*[14]	35
104	AGAGCAGCAGCCGAATTCGGTACATTACCC.TG.CTTCGAGAGAGCGCGCCTCGAATGTTCGCG	n/a	*rad51*[15]	216
105	AGCAGCAGCCGAATTCGGTACATTACCCTG.T.CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	*ku70*[15]	3
106	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*ku70*[16]	6
107	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*ku70*[17]	6
108	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*ku70*[18]	6
109	TCGTTTAGAGCAGCAGCCGAATTCGGTACA.TTA.TCCCTAGCGGCCGCATAGGCCACTAGTGGA	n/a	*ku70*[19]	8
110	TCGTTTAGAGCAGCAGCCGAATTCGGTACA.TTA.TCCCTAGCGGCCGCATAGGCCACTAGTGGA	n/a	*ku70*[20]	8
111	TCGTTTAGAGCAGCAGCCGAATTCGGTACA.TTA.TCCCTAGCGGCCGCATAGGCCACTAGTGGA	n/a	*ku70*[21]	8
112	GAGCAGCAGCCGAATTCGGTACATTACCCT.G.CCGCATAGGCCACTAGTGGATCTGGATCCT	n/a	*ku70*[22]	13
113	CGTTTAGAGCAGCAGCCGAATTCGGTACAT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*ku70*[23]	14
114	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GTGGATCTGGATCCTCTAGAGTCGACCTCG	n/a	*ku70*[24]	25
115	TCGTTTAGAGCAGCAGCCGAATTCGGTACA.TTA.TCCCTAGCGGCCGCATAGGCCACTAGTGGA	n/a	*lig4*[15]	8
116	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*lig4*[16]	6
117	GAGCAGCAGCCGAATTCGGTACATTACCCT.G.CCGCATAGGCCACTAGTGGATCTGGATCCT	n/a	*lig4*[17]	13
118	GAGCAGCAGCCGAATTCGGTACATTACCCT.G.CCGCATAGGCCACTAGTGGATCTGGATCCT	n/a	*lig4*[18]	13
119	CGTTTAGAGCAGCAGCCGAATTCGGTACAT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*lig4*[19]	14
120	TAGAGCAGCAGCCGAATTCGGTACATTACC.C.CGCATAGGCCACTAGTGGATCTGGATCCTC	n/a	*lig4*[20]	16
121	CGTCGTTTAGAGCAGCAGCCGAATTCGGTA.CAT.AGGCCACTAGTGGATCTGGATCCTCTAGAG	n/a	*lig4*[21]	26
122	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*rad51 ku70*[14]	6
123	TCGTTTAGAGCAGCAGCCGAATTCGGTACA.TTA.TCCCTAGCGGCCGCATAGGCCACTAGTGGA	n/a	*rad51 lig4*[12]	8
124	CAGCAGCCGAATTCGGTACATTACCCTGTT.AT.AGGCCACTAGTGGATCTGGATCCTCTAGAG	n/a	*rad51 lig4*[13]	15
125	AAAAATTCGTACTTTGGAGTACGAAATGCG.TCGTT.GCTTCGAGAGAGCGCGCCTCGAATGTTCGC	n/a	*rad51 lig4*[14]	250
126	GCAGCCGAATTCGGTACATTACCCTGTTATTATCCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	polQ*[14]	0
127	GCAGCCGAATTCGGTACATTACCCTGTTATTATCCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	polQ*[15]	0
128	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*polQ*[16]	6
129	GCAGCAGCCGAATTCGGTACATTACCCTGT.TA.GCGGCCGCATAGGCCACTAGTGGATCTGGA	n/a	*polQ*[17]	6
130	TCGTTTAGAGCAGCAGCCGAATTCGGTACA.TTA.TCCCTAGCGGCCGCATAGGCCACTAGTGGA	n/a	*polQ*[18]	8
131	CAGCAGCCGAATTCGGTACATTACCCTGTT.AT.AGGCCACTAGTGGATCTGGATCCTCTAGAG	n/a	*polQ*[19]	15
132	ACGAAATGCGTCGTTTAGAGCAGCAGCCGA.AT.CCCTAGCGGCCGCATAGGCCACTAGTGGAT	n/a	*polQ*[20]	20
133	CGTCGTTTAGAGCAGCAGCCGAATTCGGTA.CAT.AGGCCACTAGTGGATCTGGATCCTCTAGAG	n/a	*polQ*[21]	26

134	GGTCAGACATTTAAAAGGAGGCGACTCAAC[.]G[.]GGCCGCATAGGCCACTAGTGGATCTGGATC	n/a	*polQ*[22]	259

Table S4: Sequences of repair junctions with microhomology. SD-MMEJ consistent repair products with junctional microhomologies. 94/134 (70.1%) of microhomology junctions are SD-MMEJ consistent. This is significantly greater than predicted by random chance (p=0.05, Fisher's Exact Test). Junctional microhomologies (bases that cannot be unambiguously assigned to either side of the repair junction) are situated between boxes with dots to represent the uncertainty with regard to the position at which the strands were ligated during repair. The box notation is used to emphasize the possibility of a "zero insertion" SD-MMEJ event. The two sequences containing apparent net insertions (asterisks above genotype) are consistent with mispairing of the 3' DSB ends and are thus classified as junctional microhomologies. Other conventions are as described for Supplemental Table S2.

Table S5.

	sequence		genotype	deln	inst
1 *A1*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[1]	WT[1]	10	1
2 *A2*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[2]	*rad51*[1]	10	1
3 *A3*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[3]	*rad51*[2]	10	1
4 *A4*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[4]	*rad51*[3]	10	1
5 *A5*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[5]	*lig4*[1]	10	1
6 *A6*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[6]	*lig4*[2]	10	1
7 *A7*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[7]	*lig4 rad51*[1]	10	1
8 *A8*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[8]	*lig4 rad51*[2]	10	1
9 *A9*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[9]	*lig4 rad51*[3]	10	1
10 *A10*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCCGCATAGGCCACTAGTGGATCTGGATCCT	II[10]	*lig4 rad51*[4]	10	1
11 *B1*	GCAGCCGAATTCGGTACATTACCCTGTTATaGGCCGCATAGGCCACTAGTGGATCTGGATC	I[1]	*lig4*[3]	7	1
12 *B2*	GCAGCCGAATTCGGTACATTACCCTGTTATaGGCCGCATAGGCCACTAGTGGATCTGGATC	I[2]	*lig4 rad51*[5]	7	1
13 *C1*	GCAGCCGAATTCGGTACATTACCCTGTTATgTAGCGGCCGCATAGGCCACTAGTGGATCTG	-	*rad51*[4]	3	1
14 *C2*	GCAGCCGAATTCGGTACATTACCCTGTTATgTAGCGGCCGCATAGGCCACTAGTGGATCTG	-	*lig4*[4]	3	1
15 *D*	GCAGCAGCCGAATTCGGTACATTACCCTGTaCCGCATAGGCCACTAGTGGATCTGGATCCT	-	*ku70*[1]	12	1
16 *E*	GCAGCAGCCGAATTCGGTACATTACCCTGTaCCACTAGTGGATCTGGATCCTCTAGAGTCG	-	WT[2]	21	1
17 *F*	AGCAGCCGAATTCGGTACATTACCCTGTTAcCGGCCGCATAGGCCACTAGTGGATCTGGAT	II[11]	*rad51 ku70*[1]	7	1
18 *G*	AGCAGCCGAATTCGGTACATTACCCTGTTAcTAGGCCACTAGTGGATCTGGATCCTCTAGA	-	*rad51 lig4*[6]	15	1
19 *H*	TTAGAGCAGCAGCCGAATTCGGTACATTACaTAGCGGCCGCATAGGCCACTAGTGGATCTG	-	*polQ*[1]	11	1
20 *I*	GCAGCAGCCGAATTCGGTACATTACCCTGTgGCGGCCGCATAGGCCACTAGTGGATCTGGA	-	*rad51*[5]	8	1
21 *J*	AGCAGCAGCCGAATTCGGTACATTACCCTGgCCCTAGCGGCCGCATAGGCCACTAGTGGAT	-	WT[3]	4	1
22 *K*	GCAGCCGAATTCGGTACATTACCCTGTTATaGCCGCATAGGCCACTAGTGGATCTGGATCC	-	*lig4*[5]	8	1
23 *M*	AGCAGCAGCCGAATTCGGTACATTACCCTGcCGGCCGCATAGGCCACTAGTGGATCTGGAT	-	*rad51 lig4*[7]	10	1
24	AGCAGCCGAATTCGGTACATTACCCTGTTAaCGGCCGCATAGGCCACTAGTGGATCTGGAT	n/a	*ku70*[2]	7	1
25	CAGCAGCCGAATTCGGTACATTACCCTGTTcCGGCCGCATAGGCCACTAGTGGATCTGGAT	n/a	*lig4*[6]	8	1
26	AGCAGCAGCCGAATTCGGTACATTACCCTGaTTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*rad51 ku70*[2]	0	1
27	AGCAGCAGCCGAATTCGGTACATTACCCTGgGGCCGCATAGGCCACTAGTGGATCTGGATC	n/a	*rad51ku70*[3]	11	1
28	TAGAGCAGCAGCCGAATTCGGTACATTACCtGGCCGCATAGGCCACTAGTGGATCTGGATC	n/a	*rad51 lig4*[8]	14	1

Table S5. Sequences of repair junctions with 1 bp insertions. Sequences and genotypes of all repair products with net insertions of one bp. Inserted sequence is boxed and in lowercase. Notational conventions as for Table S2.

Table S6.

	sequence		genotype	deln	inst
1[A1]	GAGCAGCAGCCGAATTCGGTACATTACCCTatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[1]	*rad51*[1]	10	2
2[A2]	GAGCAGCAGCCGAATTCGGTACATTACCCTatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[2]	*ku70*[1]	10	2
3[A3]	GAGCAGCAGCCGAATTCGGTACATTACCCTatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[3]	*lig4*[1]	10	2
4[A4]	GAGCAGCAGCCGAATTCGGTACATTACCCTatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[4]	*rad51 ku70*[1]	10	2
5[B1]	AGCAGCCGAATTCGGTACATTACCCTGTTAgtGGCCGCATAGGCCACTAGTGGATCTGGATC	I[1]	WT[1]	8	2
6[B2]	AGCAGCCGAATTCGGTACATTACCCTGTTAgtGGCCGCATAGGCCACTAGTGGATCTGGATC	I[2]	*ku70*[2]	8	2
7[B3]	AGCAGCCGAATTCGGTACATTACCCTGTTAgtGGCCGCATAGGCCACTAGTGGATCTGGATC	I[3]	*rad51 lig4*[1]	8	2
8[C1]	AGCAGCCGAATTCGGTACATTACCCTGTTAccCGGCCGCATAGGCCACTAGTGGATCTGGAT	II[1]	*rad51*[2]	7	2
9[C2]	AGCAGCCGAATTCGGTACATTACCCTGTTAccCGGCCGCATAGGCCACTAGTGGATCTGGAT	II[2]	*rad51 ku70*[2]	7	2
10[C3]	AGCAGCCGAATTCGGTACATTACCCTGTTAccCGGCCGCATAGGCCACTAGTGGATCTGGAT	II[3]	*polQ*[1]	7	2
11[D1]	AGCAGCCGAATTCGGTACATTACCCTGTTAatGGCCGCATAGGCCACTAGTGGATCTGGATC AGCAGCCGAATTCGGTACATTACCCTGTTAatGGCCGCATAGGCCACTAGTGGATCTGGATC	I[4]	WT[2]	8	2
12[D2]	AGCAGCCGAATTCGGTACATTACCCTGTTAatGGCCGCATAGGCCACTAGTGGATCTGGATC AGCAGCCGAATTCGGTACATTACCCTGTTAatGGCCGCATAGGCCACTAGTGGATCTGGATC	I[5]	WT[3]	8	2
13[E1]	GCAGCCGAATTCGGTACATTACCCTGTTATatGGCCGCATAGGCCACTAGTGGATCTGGATC GCAGCCGAATTCGGTACATTACCCTGTTATatGGCCGCATAGGCCACTAGTGGATCTGGATC	I[6]	WT[4]	7	2
14[E2]	GCAGCCGAATTCGGTACATTACCCTGTTATatGGCCGCATAGGCCACTAGTGGATCTGGATC GCAGCCGAATTCGGTACATTACCCTGTTATatGGCCGCATAGGCCACTAGTGGATCTGGATC	I[7]	*lig4*[2]	7	2
15[F]	TTTAGAGCAGCAGCCGAATTCGGTACATTAgtGGCCGCATAGGCCACTAGTGGATCTGGATC	I[7]	*lig4*[3]	16	2
16[G]	GCAGCAGCCGAATTCGGTACATTACCCTGTatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[5]	*rad51 ku70*[3]	8	2
17[H]	GCAGCCGAATTCGGTACATTACCCTGTTATatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[6]	WT[5]	5	2
18[I]	GAGCAGCAGCCGAATTCGGTACATTACCCTatGCATAGGCCACTAGTGGATCTGGATCCTCT	-	*rad51*[3]	16	2
19[J]	GCAGCCGAATTCGGTACATTACCCTGTTATgtTAGGCCACTAGTGGATCTGGATCCTCTAGA	-	*lig4*[4]	14	2
20[K]	GCAGCCGAATTCGGTACATTACCCTGTTATgtGGCCGCATAGGCCACTAGTGGATCTGGATC GCAGCCGAATTCGGTACATTACCCTGTTATgtGGCCGCATAGGCCACTAGTGGATCTGGATC	I[8]	*rad51 lig4*[2]	7	2
21	GCAGCCGAATTCGGTACATTACCCTGTTATgtGCCGCATAGGCCACTAGTGGATCTGGATCC	n/a	*rad51*[4]	8	2
22	TAGAGCAGCAGCCGAATTCGGTACATTACCtgTTATCCCTAGCGGCCGCATAGGCCACTAGT	n/a	*rad51 ku70*[4]	1	2
23	AGAGCAGCAGCCGAATTCGGTACATTACCCctGGCCGCATAGGCCACTAGTGGATCTGGATC	n/a	*rad51 ku70*[5]	13	2
24	AGCAGCCGAATTCGGTACATTACCCTGTTAacGCCGCATAGGCCACTAGTGGATCTGGATCC	n/a	*rad51 lig4*[3]	9	2
25	CAGCAGCCGAATTCGGTACATTACCCTGTTgtGCCGCATAGGCCACTAGTGGATCTGGATCC	n/a	*rad51 lig4*[4]	10	2
26	CGTTTAGAGCAGCAGCCGAATTCGGTACATccCGGCCGCATAGGCCACTAGTGGATCTGGAT	n/a	*polQ*[2]	17	2

Table S6. Sequences of repair junctions with 2 bp insertions. Sequences and genotypes of all repair products with net insertions of 2 bp. Inserted sequence is boxed and in lowercase. For repair products with multiple SD-MMEJ consistent repeats, all repeats are indicated. Notational conventions as for Table S2.

Table S7.

	sequence		genotype	deln	inst
1[A1]	TAGAGCAGCAGCCGAATTCGGTACATTACCtatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[1]	**WT[1]**	12	3
2[A2]	TAGAGCAGCAGCCGAATTCGGTACATTACCtatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[2]	***rad51 ku70[1]***	12	3
3[A3]	TAGAGCAGCAGCCGAATTCGGTACATTACCtatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[3]	***rad51 ku70[2]***	12	3
4[B1]	GCAGCAGCCGAATTCGGTACATTACCCTGTaatGGCCGCATAGGCCACTAGTGGATCTGGATC GCAGCAGCCGAATTCGGTACATTACCCTGTaatGGCCGCATAGGCCACTAGTGGATCTGGATC	I[1]	***ku70[1]***	10	3
5[B2]	GCAGCAGCCGAATTCGGTACATTACCCTGTaatGGCCGCATAGGCCACTAGTGGATCTGGATC GCAGCAGCCGAATTCGGTACATTACCCTGTaatGGCCGCATAGGCCACTAGTGGATCTGGATC	I[2]	***rad51 ku70[3]***	10	3
6[C]	AGAGCAGCAGCCGAATTCGGTACATTACCCataGGCCGCATAGGCCACTAGTGGATCTGGATC	I[3]	***ku70[2]***	13	3
7[D]	GCAGCAGCCGAATTCGGTACATTACCCTGTagtGGCCGCATAGGCCACTAGTGGATCTGGATC	I[4]	***lig4[1]***	10	3
8[E]	GCAGCCGAATTCGGTACATTACCCTGTTATagtGGCCGCATAGGCCACTAGTGGATCTGGATC	I[5]	***rad51 lig4[1]***	7	3
9[F]	AGCAGCCGAATTCGGTACATTACCCTGTTAacaGGCCGCATAGGCCACTAGTGGATCTGGATC AGCAGCCGAATTCGGTACATTACCCTGTTAacaGGCCGCATAGGCCACTAGTGGATCTGGATC	I[6]	***lig4[2]***	8	3
10[G]	TTTAGAGCAGCAGCCGAATTCGGTACATTAggcCCGCATAGGCCACTAGTGGATCTGGATCCT	-	***polQ[1]***	18	3
11[H]	GCAGCAGCCGAATTCGGTACATTACCCTGTaatGCCGCATAGGCCACTAGTGGATCTGGATCC	-	***ku70[3]***	11	3
12[I]	GCAGCAGCCGAATTCGGTACATTACCCTGTaatGCGGCCGCATAGGCCACTAGTGGATCTGGA GCAGCAGCCGAATTCGGTACATTACCCTGTaatGCGGCCGCATAGGCCACTAGTGGATCTGGA	III[4]	***lig4[3]***	8	3
13[J]	GCAGCCGAATTCGGTACATTACCCTGTTATgttGGCCGCATAGGCCACTAGTGGATCTGGATC GCAGCCGAATTCGGTACATTACCCTGTTATgttGGCCGCATAGGCCACTAGTGGATCTGGATC	I[7]	***rad51 ku70[4]***	7	3
14	GCAGCCGAATTCGGTACATTACCCTGTTATggtGGCCGCATAGGCCACTAGTGGATCTGGATC	n/a	*rad51[1]*	7	3
15	AGCTTGAGGGAAAAAATTCGTACTTTGGAGgatATCTGGATCCTCTAGAGTCGACCTCGAACG	n/a	*rad51[2]*	81	3
16	CAGCAGCCGAATTCGGTACATTACCCTGTTggtGGCCGCATAGGCCACTAGTGGATCTGGATC	n/a	*polQ[2]*	9	3

Supplemental Table S7. Sequences and genotypes of all repair products with net insertions of 3 bp. Inserted sequence is boxed and in lowercase. For repair products with multiple SD-MMEJ consistent repeats, all repeats are indicated. Notational conventions as for Table S2.

Table S8.

	sequence of junctions with ≥4 bp insertions	genotype	del	ins
1	AGCAGCCGAATTCGGTACATTACCCTGTTAcattaTCCCTAGCGGCCGCATAGGCCACTAGTGGA	WT	0	5
2	GCAGCCGAATTCGGTACATTACCCTGTTATttacattacattatccctaCCCTAGCGGCCGCATAGGCCACTAGTGGAT	WT	0	19
3	GCAGCCGAATTCGGTACATTACCCTGTTATgggtaatgttatGCGGCCGCATAGGCCACTAGTGGATCTGGA	WT	5	12
4	GCAGCAGCCGAATTCGGTACATTACCCTGTaataaTAGCGGCCGCATAGGCCACTAGTGGATCTG	WT	6	5
5	GCAGCCGAATTCGGTACATTACCCTGTTATagggtCGGCCGCATAGGCCACTAGTGGATCTGGAT	WT	6	5
6	GCAGCCGAATTCGGTACATTACCCTGTTATgctatgtGGCCGCATAGGCCACTAGTGGATCTGGATC	WT	7	7
7	GCAGCCGAATTCGGTACATTACCCTGTTATtcacgtgccgaagtgtGGCCGCATAGGCCACTAGTGGATCTGGATC	WT	7	16
8	GCAGCAGCCGAATTCGGATTACCCTGTTATaattataattataattattatagtGGCCGCATAGGCCACTAGTGGATCTGGATC	WT	7	24
9	GCAGCAGCCGAATTCGGATTACCCTGTTATaacaggttatgcgcataacccactatGGCCGCATAGGCCACTAGTGGATCTGGATC	WT	7	26
10	AGCAGCAGCCGAATTCGGTACATTACCCTGcggtaAGCGGCCGCATAGGCCACTAGTGGATCTGG	WT	8	5
11	AGCAGCCGAATTCGGTACATTACCCTGTTAacagggtaGGCCGCATAGGCCACTAGTGGATCTGGATC	WT	8	8
12	AGCAGCAGCCGAATTCGGTACATTACCCTGctatgtGGCCGCATAGGCCACTAGTGGATCTGGATC	WT	11	6
13	AGAGCAGCAGCCGAATTCGGTACATTACCCggttcCGGCCGCATAGGCCACTAGTGGATCTGGAT	WT	12	5
14	GCAGCAGCCGAATTCGGTACATTACCCTGTggcctttCGCATAGGCCACTAGTGGATCTGGATCCTC	WT	13	8
15	GCAGCAGCCGAATTCGGTACATTACCCTGTaatgtaatgtaacgtataggccatATAGGCCACTAGTGGATCTGGATCCTCTAG	WT	16	24
16	TAGAGCAGCAGCCGAATTCGGTACATTACCgaatagggtaatgtgGCATAGGCCACTAGTGGATCTGGATCCTCT	WT	18	15
17	AGCAGCAGCCGAATTCGGTACATTACCCTGcattaccctacattaccattcTTATCCCTAGCGGCCGCATAGGCCACTAGT	*rad51*	0	21
18	GCAGCCGAATTCGGTACATTACCCTGTTATttatCCCTAGCGGCCGCATAGGCCACTAGTGGAT	*rad51*	0	4
19	AGCAGCCGAATTCGGTACATTACCCTGTTAccctgtTAGCGGCCGCATAGGCCACTAGTGGATCTG	*rad51*	4	6
20	GCAGCCGAATTCGGTACATTACCCTGTTATccctgggtatgttagggatatagggatgttatccctgtGCCGCATAGGCCACTAGTGGATCTGGATCC	*rad51*	8	38
21	GCAGCCGAATTCGGTACATTACCCTGTTATgttagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51*	7	6
22	GCAGCCGAATTCGGTACATTACCCTGTTATatatatagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51*	7	9
23	GCAGCCGAATTCGGTACATTACCCTGTTATgtacattagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51*	7	10
24	GCAGCCGAATTCGGTACATTACCCTGTTATacaggtattaccctGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51*	7	14
25	AGCAGCCGAATTCGGTACATTACCCTGTTAccctgtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51*	8	6
26	AGCAGCCGAATTCGGTACATTACCCTGTTAccctgtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51*	8	6
27	CAGCAGCCGAATTCGGTACATTACCCTGTT**gtgtagt****GGCC**GCATA**GGCCACTA**GTGGATCTGGATC	*rad51*	9	7
28	GCAGCCGAATTCGGTACATTACCCTGTTAT**aggccgcatatac**CCGCATAGGCCACTAGTGGATCTGGATCCT	*rad51*	9	13
29	TTAGAGCAGCAGCCGAATTCGGTACATTAC**ataggcatagggtaatgtag**CTAGCGGCCGCATAGGCCACTAGTGGATCT	*rad51*	10	20
30	AGAGCAGCAGCCGAATTCGGTACATTACCC**gaattacattaccggccggc**AGCGGCCGCATAGGCCACTAGTGGATCTGG	*rad51*	10	20
31	GCAGCAGCCGAATTCGGTACATTACCCTGT**accct****GGCC**GCATA**GGCCA**CTAGTGGATCTGGATC	*rad51*	10	5
32	GCAGCAGCCGAATTCGGTACATTACCCTGT**attacccggtacagt****GGCC**GCATA**GGCCACT**AGTGGATCTGGATC	*rad51*	10	15
33	AGCAGCCGAATTCGGTACA**TTAC**CCTG**TTA****ctagatcgtggatcgttgttac**CCGCATAGGCCACTAGTGGATCTGGATCCT	*rad51*	10	22
34	GCAGCCGAATTCGGTACAT**TACCCT**GTTAT**agggt****A**TAGGCCACTAGTGGATCTGGATCCTCTA	*rad51*	13	5
35	GCAGCCGAATTCGGTACATTACCCTGTTAT**tagggt**ATAGGCCACTAGTGGATCTGGATCCTCTAG	*rad51*	13	6
36	GCAGCCGAATTCGGTACATTACCCTGTTAT**agggtaatca**AGGCCACTAGTGGATCTGGATCCTCTAGAG	*rad51*	15	10
37	AGAGCAGCAGCCGAATTCGGTACATTACCC**cgttaccct**GCATAGGCCACTAGTGGATCTGGATCCTCT	*rad51*	17	9
38	AGCAGCAGCCGAATTCGGTACATTACCCTGgatccattatccagatccaTTATCCCTAGCGGCCGCATAGGCCACTAGT	*ku70*	0	21
39	GCAGCAGCCGAATTCGGTACATTACCCTGTattatTATCCCTAGCGGCCGCATAGGCCACTAGTG	*ku70*	0	5
40	GCAGCAGCCGAATTCGGTACATTACCCTGTggtaataccctgttacattgtTATCCCTAGCGGCCGCATAGGCCACTAGTG	*ku70*	0	21
41	GCAGCAGCCGAATTCGGTACATTACCCTGTaccctgtacattaccctgtacatTATCCCTAGCGGCCGCATAGGCCACTAGTG	*ku70*	0	23
42	AGCAGCCGAATTCGGTACATACCCTGTTATtatccctattattaccacattattatCCCTAGCGGCCGCATAGGCCACTAGTGGAT	*ku70*	0	26
43	GAGCAGCAGCCGAATTCGGTACATTACCCTttacaTTATCCCTAGCGGCCGCATAGGCCACTAGT	*ku70*	1	5

44	AGCAGCCGAATTCGGTACATTACCCTGTTAgctaCTAGCGGCCGCATAGGCCACTAGTGGATCT	*ku70*	3	4
45	GCAGCCGAATTCGGTACATTACCCTGTTATaacaGGCCGCATAGGCCACTAGTGGATCTGGATC	*ku70*	7	4
46	GAGCAGCAGCCGAATTCGGTACATTACCCTaacattaTAGCGGCCGCATAGGCCACTAGTGGATCTG	*ku70*	8	7
47	AGAGCAGCAGCCGAATTCGGTACATTACCCggtaCCGCCGCATAGGCCACTAGTGGATCTGGAT	*ku70*	12	4
48	AGCAGCAGCCGAATTCGGTACATTACCCTGcatagggcataacataggcCCGCATAGGCCACTAGTGGATCTGGATCCT	*ku70*	13	19
49	GTTTAGAGCAGCAGCCGAATTCGGTACATTcggtacAGCGGCCGCATAGGCCACTAGTGGATCTGG	*ku70*	14	6
50	GCCGAATTCGGTACATTACCCTGTTAGTTAccctgttaccCGACCTCGAACGTTAACGTTAACGTAACGT	*ku70*	47	10
51	GAGCAGCAGCCGAATTCGGTACATTACCCTagagtaatgtacctacccAAATAGAGGCGCTTCGTCGACGGAGCGTCA	*ku70*	267	18
52	CAATTTTTTTTTGAAAACATTAACCCTTACagggttaCCTAGCGGCCGCATAGGCCACTAGTGGATC	*ku70*	476	7
53	AGCAGCCGAATTCGGTACATTACCCTGTTAatgtaccctatgtacattaTCCCTAGCGGCCGCATAGGCCACTAGTGGA	*lig4*	0	19
54	GCAGCCGAATTCGGTACATTACCCTGTTATttattatccctaCCCTAGCGGCCGCATAGGCCACTAGTGGAT	*lig4*	0	12
55	GCAGCCGAATTCGGTACATTACCCTGTTATcctgttatCCCTAGCGGCCGCATAGGCCACTAGTGGAT	*lig4*	0	8
56	GCAGCCGAATTCGGTACATTACCCTGTTATgtactatgTAGCGGCCGCATAGGCCACTAGTGGATCTG	*lig4*	3	8
57	GCAGCCGAATTCGGTACATTACCCTGTTATgcggcctatGCGGCCGCATAGGCCACTAGTGGATCTGGA	*lig4*	5	9
58	GCAGCCGAATTCGGTACATTACCCTGTTATaagtggccacattatGCGGCCGCATAGGCCACTAGTGGATCTGGA	*lig4*	5	15
59	GCAGCCGAATTCGGTACATTACCCTGTTATtatcCGGCCGCATAGGCCACTAGTGGATCTGGAT	*lig4*	6	4
60	GCAGCAGCCGAATTCGGTACATTACCCTGTaattacAGCGGCCGCATAGGCCACTAGTGGATCTGG	*lig4*	7	6
61	GCAGCAGCCGAATTCGGTACATTACCCTGTcaagcctgtcaAGCGGCCGCATAGGCCACTAGTGGATCTGG	*lig4*	7	11
62	AGCAGCCGAATTCGGTACATTACCCTGTTAatgtatgtacCGGCCGCATAGGCCACTAGTGGATCTGGAT	*lig4*	7	10
63	GCAGCCGAATTCGGTACATTACCCTGTTATaagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	7	4
64	GCAGCCGAATTCGGTACATTACCCTGTTATtacaGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	7	4
65	GCAGCCGAATTCGGTACATTACCCTGTTATaacagGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	7	5
66	GCAGCCGAATTCGGTACATTACCCTGTTATaacagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	7	6
67	GCAGCCGAATTCGGTACATTACCCTGTTATaacagggtGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	7	8
68	GCAGCCGAATTCGGTACATTACCCTGTTATaacagggtatGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	7	10
69	GCAGCCGAATTCGGTACATTACCCTGTTATaacatagtgtagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	7	13
70	GCAGCCGAATTCGGTACATTACCCTGTTATaacaggtattaccctGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	7	15
71	GCAGCCGAATTCGGTACATTACCCTGTTATaatgtaccctatgtaatgtatgcggcctGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	7	28
72	AGCAGCAGCCGAATTCGGTACATTACCCTGcggcctaAGCGGCCGCATAGGCCACTAGTGGATCTGG	*lig4*	8	7
73	AGCAGCCGAATTCGGTACATTACCCTGTTAatgtGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	8	4
74	AGCAGCCGAATTCGGTACATTACCCTGTTAccctgtGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	8	6
75	AGCAGCCGAATTCGGTACATTACCCTGTTAccctgtGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	8	6
76	TAGAGCAGCAGCCGAATTCGGTACATTACCgacattacaCTAGCGGCCGCATAGGCCACTAGTGGATCT	*lig4*	9	9
77	GCAGCAGCCGAATTCGGTACATTACCCTGTacatGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	10	4
78	GCAGCAGCCGAATTCGGTACATTACCCTGTgggtaataGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	10	8
79	GCAGCAGCCGAATTCGGTACATTACCCTGTggccggtacatagtgGCCGCATAGGCCACTAGTGGATCTGGATCC	*lig4*	10	14
80	AGCAGCCGAATTCGGTACATTACCCTGTTAcatacCCGCATAGGCCACTAGTGGATCTGGATCCT	*lig4*	10	5
81	GAGCAGCAGCCGAATTCGGTACATTACCCTacctacattacCGGCCGCATAGGCCACTAGTGGATCTGGAT	*lig4*	11	11
82	GCAGCAGCCGAATTCGGTACATTACCCTGTaatacctatGCCGCATAGGCCACTAGTGGATCTGGATCC	*lig4*	11	9
83	GCAGCAGCCGAATTCGGTACATTACCCTGTacattacCCGCATAGGCCACTAGTGGATCTGGATCCT	*lig4*	12	7
84	TAGAGCAGCAGCCGAATTCGGTACATTACCtcattacctatGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	14	11
85	GCAGCAGCCGAATTCGGTACATTACCCTGTaggcctGCATAGGCCACTAGTGGATCTGGATCCTCT	*lig4*	14	6
86	TTAGAGCAGCAGCCGAATTCGGTACATTACtggatcacagggtaatgtGGCCGCATAGGCCACTAGTGGATCTGGATC	*lig4*	15	18
87	AGAGCAGCAGCCGAATTCGGTACATTACCCatgtaCCGCATAGGCCACTAGTGGATCTGGATCCT	*lig4*	15	5

88	AGCAGCAGCCGAATTCGGTACATTACCCTGccactagtgGCATAGGCCACTAGTGGATCTGGATCCTCT	*lig4*	15	9
89	GCAGCAGCCGAATTCGGTACATTACCCTGTaccgaggcctcgTAGGCCACTAGTGGATCTGGATCCTCTAGA	*lig4*	17	12
90	TACGAAATGCGTCGTTTAGAGCAGCAGCCGggtaaggccgggctaagtGCCGCATAGGCCACTAGTGGATCTGGATCC	*lig4*	31	18
91	GCAGCCGAATTCGGTACATTACCCTGTTATcctattatCCCTAGCGGCCGCATAGGCCACTAGTGGAT	*rad51 ku70*	0	8
92	GCAGCCGAATTCGGTACATTACCCTGTTATccattatccattatccattatcctaccattatCCCTAGCGGCCGCATAGGCCACTAGTGGAT	*rad51 ku70*	0	32
93	GCAGCAGCCGAATTCGGTACATTACCCTGTacattacattacattacattacccggtacattatccaCTAGCGGCCGCATAGGCCACTAGTGGATCT	*rad51 ku70*	5	37
94	GCAGCAGCCGAATTCGGTACATTACCCTGTacattacattacattacattacccggtacattatccaCTAGCGGCCGCATAGGCCACTAGTGGATCT	*rad51 ku70*	5	37
95	GCAGCCGAATTCGGTACATTACCCTGTTATcattacattatGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 ku70*	7	11
96	GCAGCCGAATTCGGTACATTACCCTGTTATagggtatataatgcggctatGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 ku70*	7	20
97	AGCAGCCGAATTCGGTACATTACCCTGTTAacgggtaacgggtaacagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 ku70*	8	19
98	GCAGCAGCCGAATTCGGTACATTACCCTGTaatgtaccacagggtacatcggccacaggcctatgtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 ku70*	10	36
99	AGCAGCCGAATTCGGTACATTACCCTGTTAacataacatatgttaacattacatatgtaatggcctatgCGCATAGGCCACTAGTGGATCTGGATCCTC	*rad51 ku70*	11	39
100	AGCAGCAGCCGAATTCGGTACATTACCCTGggtaattacCCGCATAGGCCACTAGTGGATCTGGATCCT	*rad51 ku70*	13	9
101	AGCAGCCGAATTCGGTACATTACCCTGTTAggccgcatgGGCCACTGTGGATCTGGATCCTCTAGAGTC	*rad51 ku70*	17	9
102	TAATGAAAATAAGAGCTTGAGGGAAAAAATcctatgccacctaatagggGCATAGGCCACTAGTGGATCTGGATCCTCT	*rad51 ku70*	77	19
103	GCAGCCGAATTCGGTACATTACCCTGTTATaacggccaacaggGCGGCCGCATAGGCCACTAGTGGATCTGGA	*rad51 lig4*	5	13
104	AGCAGCCGAATTCGGTACATTACCCTGTTAatgctatGCGGCCGCATAGGCCACTAGTGGATCTGGA	*rad51 lig4*	6	7
105	GCAGCCGAATTCGGTACATTACCCTGTTATaacagccggcCGGCCGCATAGGCCACTAGTGGATCTGGAT	*rad51 lig4*	6	10
106	GCAGCCGAATTCGGTACATTACCCTGTTATctgttacctGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	7	9
107	GCAGCCGAATTCGGTACATTACCCTGTTATggataGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	7	5
108	GCAGCCGAATTCGGTACATTACCCTGTTATaacagGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	7	5
109	GCAGCCGAATTCGGTACATTACCCTGTTATacattaccctGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	7	10
110	GAGCAGCAGCCGAATTCGGTACATTACCCTaatgtacaTAGCGGCCGCATAGGCCACTAGTGGATCTG	*rad51 lig4*	8	8
111	AGCAGCCGAATTCGGTACATTACCCTGTTAatgtatGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	8	6
112	AGCAGCCGAATTCGGTACATTACCCTGTTAccctggGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	8	6
113	AGCAGCCGAATTCGGTACATTACCCTGTTAggcataGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	8	6
114	AGCAGCCGAATTCGGTACATTACCCTGTTAgggtagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	8	7
115	AGCAGCCGAATTCGGTACATTACCCTGTTAgggtaatggccacatGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	8	15
116	AGCAGCCGAATTCGGTACATTACCCTGTTAattaccgggtattagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	8	16
117	GCAGCCGAATTCGGTACATTACCCTGTTATgtatGCCGCATAGGCCACTAGTGGATCTGGATCC	*rad51 lig4*	8	4
118	GCAGCCGAATTCGGTACATTACCCTGTTATaacatacCCGCATAGGCCACTAGTGGATCTGGATCCT	*rad51 lig4*	9	7
119	AGCAGCCGAATTCGGTACATTACCCTGTTAacaggggCGCATAGGCCACTAGTGGATCTGGATCCTC	*rad51 lig4*	11	7
120	CAGCAGCCGAATTCGGTACATTACCCTGTTgggtCGCATAGGCCACTAGTGGATCTGGATCCTC	*rad51 lig4*	12	4
121	AGAGCAGCAGCCGAATTCGGTACATTACCCgaataGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	13	5
122	AGAGCAGCAGCCGAATTCGGTACATTACCCgcatagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	13	7
123	AGAGCAGCAGCCGAATTCGGTACATTACCCgaattcggtacatagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	13	16
124	TAGAGCAGCAGCCGAATTCGGTACATTACCtatgtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	14	5
125	GCAGCAGCCGAATTCGGTACATTACCCTGTaatgtATAGGCCACTAGTGGATCTGGATCCTCTAG	*rad51 lig4*	16	5
126	CGTCGTTTAGAGCAGCAGCCGAATTCGGTAttccactatGCGGCCGCATAGGCCACTAGTGGATCTGGA	*rad51 lig4*	19	9
127	TGCGTCGTTTAGAGCAGCAGCCGAATTCGGctagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*rad51 lig4*	23	5
128	AGCAGCCGAATTCGGTACATTACCCTGTTAcattaTCCCTAGCGGCCGCATAGGCCACTAGTGGA	*polQ*	0	5
129	GCAGCCGAATTCGGTACATTACCCTGTTATagcggtaCTAGCGGCCGCATAGGCCACTAGTGGATCT	*polQ*	2	7
130	AGCAGCCGAATTCGGTACATTACCCTGTTAccctGGCCGCATAGGCCACTAGTGGATCTGGATC	*polQ*	8	4
131	GCAGCAGCCGAATTCGGTACATTACCCTGTaatgtactagtGGCCGCATAGGCCACTAGTGGATCTGGATC	*polQ*	10	11
132	AGAGCAGCAGCCGAATTCGGTACATTACCCgaataataccCGGCCGCATAGGCCACTAGTGGATCTGGAT	*polQ*	12	10

Supplemental Table S8. Sequences and genotypes of all repair products with net insertions of ≥4 bp. Inserted sequence is boxed and in lowercase. Notational conventions as for Table S2.