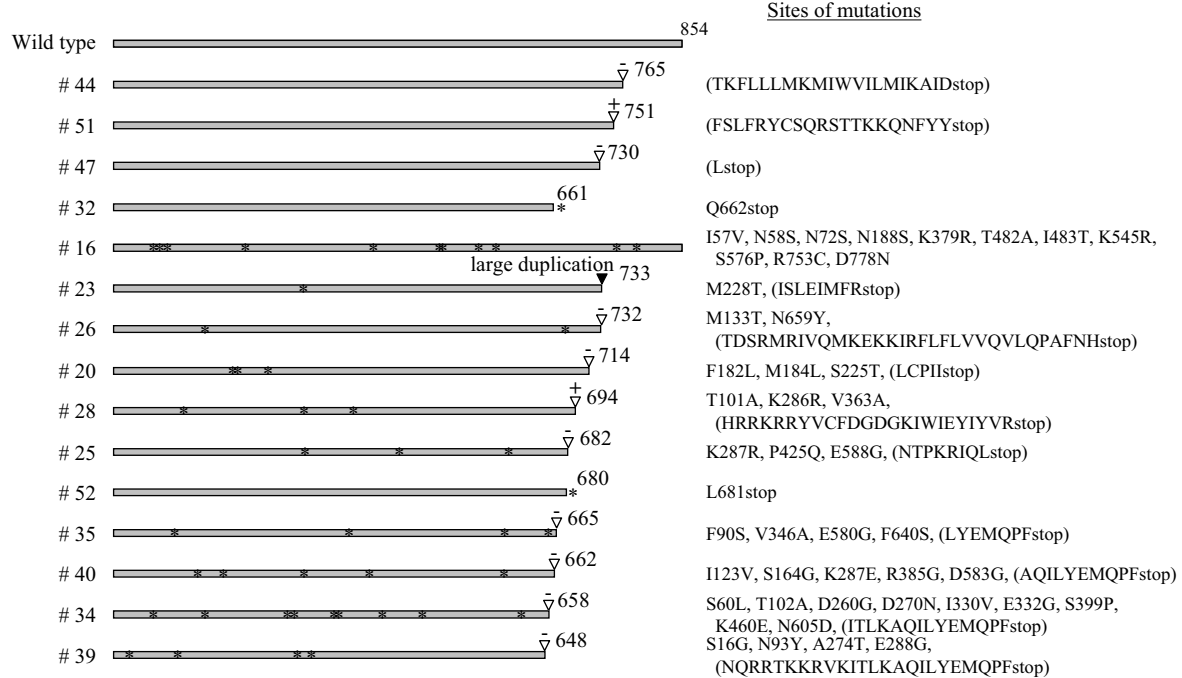
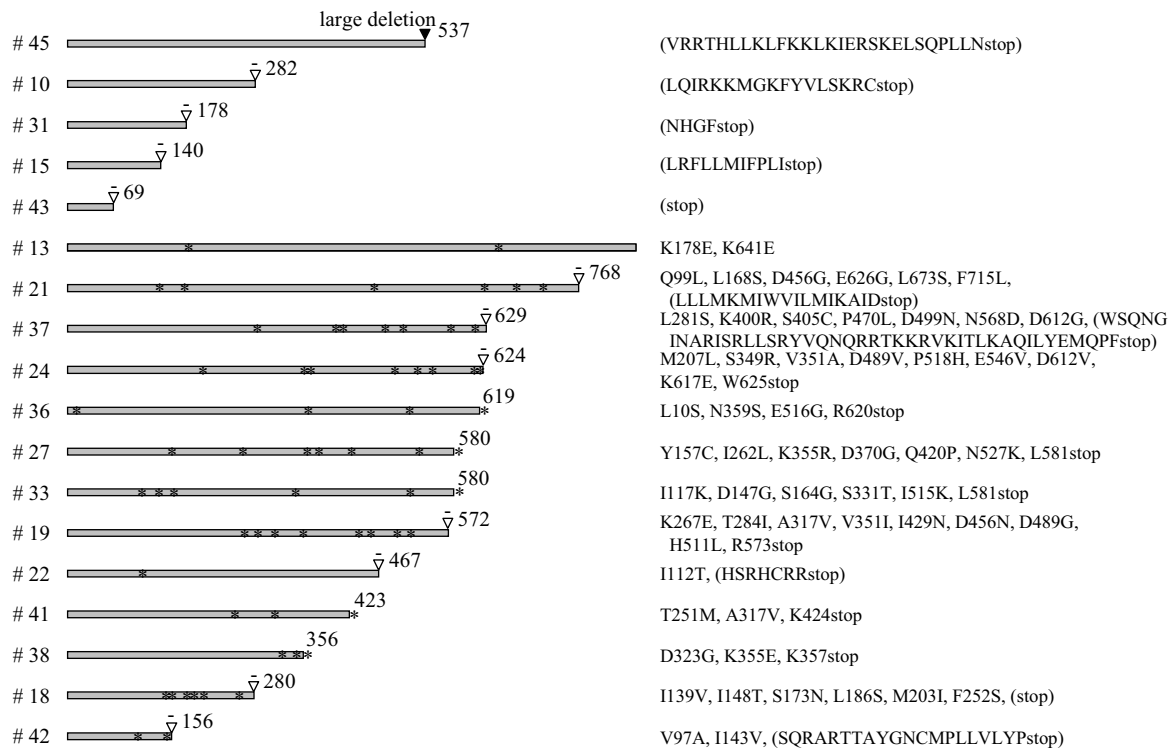


**A****B**

\* : missense or nonsense mutation, ∇ : frameshift mutation caused by 1 bp deletion  
 † : frameshift mutation caused by 1 bp insertion, ▼ : frameshift mutation caused by large deletion or duplication

**Supplementary Figure 1.** The mutation sites of 33 *xrs2* mutants that were isolated by primary screening for senescence phenotype in a *mecl1 smll1 hdf1* background. (A) Mutants that are resistant to MMS and HU. (B) Mutants that are sensitive to them. Numbers beside gray bars indicate amino acid residues just before nonsense or frameshift mutations. The positions of mutation sites are indicated at right side. Amino acids in parentheses indicate translated sequences following frameshift mutations.

## Supplementary Table 1

Sequences of primer DNA used for construction of the truncated *xrs2* mutants with tags

Name	Sequence (described 5' to 3')	Mutant (Direction)
YTP881	CAAAATATAATTTAATGAAATTGGAAATACTCGGAAAATTTATCAATCGATGAATTCGAGCTCG	All $\Delta C$ (Reverse)
YTP882	GACGATGACGACGGTCCGAAGTTTACGTTCAAAAAGAAAGAAAAGGACGTACGCTGCAGGTCGAC	$\Delta C0$ (Forward)
YTP883	TTTTCTCGTTGTTACAGGTACTGCAGCCAGCGTTCAACCACTAAAAAGTACGCTGCAGGTCGAC	$\Delta C1$ (Forward)
YTP884	CCGTTAAAAAATACTCCAAAAAGGATACAACACTACAAAATGGGGCCGTACGCTGCAGGTCGAC	$\Delta C2$ (Forward)
YTP885	CGTCCAAAATCAAAGGCGCACAAAGAAGAGGGTAAAAATAACACTCGTACGCTGCAGGTCGAC	$\Delta C3$ (Forward)
YTP886	GGAAACAAAACAAGCAGAACAACTGAAAAATGGGAAAATAGCCTACGTACGCTGCAGGTCGAC	$\Delta C4$ (Forward)
YTP887	TCATTTGATAGTGAGGAAAACAAAACAAGCAGAACAACTGAAAAAGTACGCTGCAGGTCGAC	$\Delta C5$ (Forward)
YTP888	ACTAAAAATAGAGAGGTCAAAAAGAGTTAAGTCAACCATTGTTGAACGTACGCTGCAGGTCGAC	$\Delta C6$ (Forward)
YTP889	TTGCCGAGGTAGCAGGGATTGGCTCTCAAACCATATCTTCGAACCGTACGCTGCAGGTCGAC	$\Delta C7$ (Forward)
YTP890	GATTTTTTGTCTGGAGGTTTGTAGTACTAAGACTCTATCAGAAAATCGTACGCTGCAGGTCGAC	$\Delta C8$ (Forward)
YTP891	TATGTTGACAGCTTGAAGCATCAACAGAATACCTGATTTTGACACGTACGCTGCAGGTCGAC	$\Delta C9$ (Forward)
YTP892	ACGTTCAATATAAATTTATTTGCATTTGACAACATTGATAGTTTACGTACGCTGCAGGTCGAC	$\Delta C10$ (Forward)
YTP893	AGGCTGAATAATATCAGAGTGTTAACTACTATCAAAAAGTGAACCGTACGCTGCAGGTCGAC	$\Delta C11$ (Forward)
YTP894	GATATGATTAGTAATCCGGAGTACAATGTTTTGATTTTGATCCACGTACGCTGCAGGTCGAC	$\Delta C12$ (Forward)
YTP895	GAGCAACAATACTGAGAAGGTGATAACTATAAATTTATGTGGGTAAGGGAACAAAAGCTGGAGC	All $\Delta N$ (Forward)
YTP896	TATAAAGCTAATAGAGCCATCTTCCAATGTATTCTGGTATCGTACCTGTAGGGCGAATTGGGTAC	$\Delta N0$ (Reverse)
YTP897	ATTTTTAATTATCAGTGGGTTTTTACTTGATCTACCTATACTATACTGTAGGGCGAATTGGGTAC	$\Delta N1$ (Reverse)
YTP898	GTGTTTCAGATCCGAACCTATTATTGATTTCCCATTTGAATGTGATCTGTAGGGCGAATTGGGTAC	$\Delta N2$ (Reverse)
YTP899	CGAGGCATTAATAGTAAATGTTTCGCCAACTTTCATGAATTTTTCTGTAGGGCGAATTGGGTAC	$\Delta N3$ (Reverse)
YTP900	ACCATATTCAGAAAGCATCGTCCTGAATTGTGTCAAATGAGGAGGCTGTAGGGCGAATTGGGTAC	$\Delta N4$ (Reverse)
YTP901	GTTGTCCTCGCTCTTTGGGTAATCGCTAATCATCAGATTAGCGGGCTGTAGGGCGAATTGGGTAC	$\Delta N5$ (Reverse)
YTP902	TGTGGGAAGAAGAGTATTACACAATCCATCAGAAACCGTGATTTCTGTAGGGCGAATTGGGTAC	$\Delta N6$ (Reverse)
YTP903	CACTCTGATATTATTCAGCCTCATAAATTCGAAAGCAAAATATTCTGTAGGGCGAATTGGGTAC	$\Delta N7$ (Reverse)
YTP904	TGCAATAAATTTATATTGAACGTCCGCAGGAGAGATGATAGACGCTGTAGGGCGAATTGGGTAC	$\Delta N8$ (Reverse)
YTP905	AATCAGGTATTCTGTTGATGCTTCCAAGCTGTCAACATATTATACTGTAGGGCGAATTGGGTAC	$\Delta N9$ (Reverse)
YTP906	TTTGATAGTACATAGAATTTCCCATTTCTTTCTTATCTGTAGTCTGTAGGGCGAATTGGGTAC	$\Delta N10$ (Reverse)
YTP916	CATTCCTCAGAAATTTGATCAAATTTACCGTTATCTAGAGTTCTCTGTAGGGCGAATTGGGTAC	$\Delta N11$ (Reverse)
YTP917	CAAACTCCAGCAAAAAAATCAAGACTATCGAGTGGTAGTACTCTCTGTAGGGCGAATTGGGTAC	$\Delta N12$ (Reverse)
YTP918	TGATTCTGCGCCACAATTAAGTCTCTTAGCGTCAGTTAAAGACCTCTGTAGGGCGAATTGGGTAC	$\Delta N13$ (Reverse)
YTP919	AGCACCAGGGCTACTGTGACCACTTTTCTTTCCAATATCTTCAGTCTGTAGGGCGAATTGGGTAC	$\Delta N14$ (Reverse)
YTP920	AGATATGTTTGTAGAGCCAATCCCTGCTACCTCCGCAATGACGGCTGTAGGGCGAATTGGGTAC	$\Delta N15$ (Reverse)
YTP921	AGCATCATCCATCGAATTCACAGCAGCTGTTTCATAGTCAGCGGACTGTAGGGCGAATTGGGTAC	$\Delta N16$ (Reverse)
YTP922	TGAAATTTCTCGTGAATAATTAGAAAGTTTACGGATGTTTTAGACTGTAGGGCGAATTGGGTAC	$\Delta N17$ (Reverse)
YTP923	TTTTAGCTGATTAATAGCTTCCTCGCTCAACTCCTCATCCTTCAACTGTAGGGCGAATTGGGTAC	$\Delta N18$ (Reverse)
YTP924	ATTCTTGCCTTTATGCCATTCTGGCTCCATTAGGCTATTTCCACCTGTAGGGCGAATTGGGTAC	$\Delta N19$ (Reverse)
YTP925	GACAAAAGTCTTGAAATTTCTGCGTTTATGCCATTCTGGCTCCATCTGTAGGGCGAATTGGGTAC	$\Delta N20$ (Reverse)
YTP926	TCTAGTGATTA AAAAGGCTGCATTTCTGATAAAAATCTGAGCTTTGCTGTAGGGCGAATTGGGTAC	$\Delta N21$ , $\Delta M$ (Reverse)
YTP938	GGAAACAAAACAAGCAGAACAACTGAAAAATGGGAAAATAGCCTAAGGGAACAAAAGCTGGAGC	$\Delta M$ (Forward)

Sequences with underline are corresponding to vectors sequences.

## Supplementary Table 2

Sequences of primer DNA used in this study

Name	Sequence (described 5' to 3')	Gene ( <u>Underline</u> )
Primers for cloning		
YTP181	<u>GCGGATCC</u> AAATTGCGGTAGAATGGTGTC	5'-UTR of <i>XRS2</i> ( <i>Bam</i> HI site tag)
YTP182	<u>GCGGATCC</u> TTTCACTCTGCCTGAGGATG	3'-UTR of <i>XRS2</i> ( <i>Bam</i> HI site tag)
YTP157	<u>ACGCGTCGAC</u> ATGGAAGCTGAAGTCAAGG	5'-UTR of <i>HDF1</i> ( <i>Sal</i> I site tag)
YTP158	<u>TCAGGTCGAC</u> GTGCAGATGACGAAGAAGGC	3'-UTR of <i>HDF1</i> ( <i>Sal</i> I site tag)
YTP907	<u>ACCGCTCGAG</u> TTGATGAAAGAACCAAGGCTG	Inside of <i>MET17</i> ORF ( <i>Xho</i> I site tag)
YTP908	<u>AGCGCTCGAG</u> CACCGTGTCTTTCAGCTCTC	Inside of <i>MET17</i> ORF ( <i>Xho</i> I site tag)
XRS-N	<u>CCGTCGAC</u> TGTGGGTAGTACGATACCAG	N-terminus of <i>XRS2</i> ( <i>Sal</i> I site tag)
XRS-C	<u>GCGTCGAC</u> AAAACCGATCCGATACAGCTG	C-terminus of <i>XRS2</i> ( <i>Sal</i> I site tag)
MRE-N	<u>CCGGATCC</u> TGGACTATCCTGATCCAGAC	N-terminus of <i>MRE11</i> ( <i>Bam</i> HI site tag)
MRE-C	<u>CGCTGCAGG</u> TTGTTCCGGAAGGCAAGC	C-terminus of <i>MRE11</i> ( <i>Pst</i> I site tag)
YTP949	<u>TCGGAATTC</u> ATGGAGCCAGAATGGCATAAACG	Inside of <i>xrs2-E1</i> and <i>-E3</i> ( <i>Eco</i> RI site tag)
YTP947	<u>TGCGAATTC</u> GCTATTCATCCAGCAGGCC	3'-UTR of <i>xrs2-E1</i> to <i>-E4</i> ( <i>Eco</i> RI site tag)
YTP948	<u>TCGGAATTC</u> TTGAAGGATGAGGAGTTGAGC	Inside of <i>xrs2-E2</i> and <i>-E4</i> ( <i>Eco</i> RI site tag)
Primers for gene disruption		
YTP909	GTAATAGATGAGCAACAATACTGAGAAGGTGATAACTATAAATTTAGATTGTACTGAGAGTGACAC	<i>xrs2Δ</i> (pRS vector)
YTP915	CAAAATATAATTTAATGAAATTGGAAATACTCGGAAAATTTATCACTGTGCGGTATTTACACCCG	<i>xrs2Δ</i> (pRS vector)
YTP115	CTATTCCTGATTCGGCATATCAGGTAATCATGATGATGCGTCGGAGATTGTACTGAGAGTGACAC	<i>mre11Δ</i> (pRS vector)
YTP116	TCGTTGCAGTTCGCACTCGTTTGGGTTTGCTCGTTGGCTTACTGCCTGTGCGGTATTTACACCCG	<i>mre11Δ</i> (pRS vector)
YTP119	ATCTTGGAAATACGTGATATTTCTGTCACCAAGAAGACAGCCTGTGGAGATTGTACTGAGAGTGACAC	<i>rad50Δ</i> (pRS vector)
YTP120	TTCTTCATCTAAATTGGTGGTAGGTTCTGCTAGTGCAATTACGCCCTGTGCGGTATTTACACCCG	<i>rad50Δ</i> (pRS vector)