|  |  |  |
| --- | --- | --- |
|   | **Mammals** | **Yeast (S.Cerevisiae)** |
| **DNA strand Break** |    |
| **NHEJ**  |
| End Binding | MREII-RAD50-NBSI [MRN], Ku70-ku80-DNAPKcs complex | MreII-Ra50-Xrs (MRN) Ku70-ku80 |
| Artemis, APLF, PNK, APTX |   |
| End processing | LigaseIV-XRCC4-XLF complex | Lig4-Lif1-Nei1 |
| Ligation | MRN, CtIP, EXOI, BLM, DNA2? | MRX, Sae2, Exol, Sgs1, Dna2, |
| **HR** |
| End Resection | RPA, RAD51, RAD52, RAD54, RAD51 paralogs, BRCA2, PALB2 | Rfa, Rad51, Rad51, Rad54, Rad55, -Rad57 |
| Homology search strand pairing | PCNA, Pol σ | PCNA, Pol σ |
| MUS81, EMEI, GENI, SLX1- SLX4, XPP-ERCC1 | Mus81-EmeI, Yen1, Six1, Six4, Rad1-Rad10 |
| DNA Synthesis HR resolvases | BLM, -TOPOIII-RAM11- RAM12, RTEL1 | Sgs1-Top3-Rmi1, Srs2 |
| Dissolution of HR intermediates |   |   |
| **SSB**  |
| Detection | PARP-1 |   |
| End processing | APE1, XRCC1, PNK, APTX |   |
| Gap filling ligation | LigaseIII, Pol **β** |   |
| **DNA damage signaling** |    |
| Sensors | MRN/RPA | MRX, Rfa [+RFC-Like, PCNA- like checkpoint clamp |
| Transducers | ATM, ATR-ATRIP | Tell, Mcc1-Ddc2 |
| **Mediators**   |
| ATM signaling | 53BP1, MDCI, BCA1, MCPH1, PTIP | Rad9 |
| ATR signaling | TopBPI, Claspin, | Dpb11, Mre1 |
| Effectors | CHK1, CHK2 | Chk1, Rad53 |

**Footnote**: NHEJ – Non-homologous end joining, HR – Homologous recombination, NR- Non reported, ATM- Ataxia Telangiatectsia Mutated, ATR- Ataxia-telangiectasia- and Rad3-related, DNA-PKcs- DNA-dependent protein kinase, catalytic subunit, MRN- MRE11- RAD50- NBS1, 53BP1-p53 binding protein 1, BRCA-1- breast **cancer** 1, BRCA-2- breast **cancer** 2, CHK-I- Checkpoint kinase I, CHK-II- Check point kinase 1, P53- Tumor Protein 53 gene. CDC25C- cell division cycle 25C [5,6,21,22]