A. Class 1, NCO

B. Class 2, NCO, mechanism 1

C. Class 2, NCO, mechanism 2

D. Class 3, NCO, mechanism 1

E. Class 3, NCO, mechanism 2

F. Class 4, CO
A. Class 5, NCO

B. Class 6, CO

C. Class 7, CO

D. Class 8, NCO, mechanism 1

E. Class 8, NCO, mechanism 2

Fig. S2
S3

<table>
<thead>
<tr>
<th>S3</th>
<th>NCO1</th>
<th>NCO2</th>
<th>NCO3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple heteroduplex. DSB on blue chromatid.</td>
<td>Simple heteroduplex. DSB on red chromatid.</td>
<td>Long heteroduplex with regions of homoduplex. DSB on red chromatid.</td>
</tr>
<tr>
<td></td>
<td>SDSA</td>
<td>SDSA</td>
<td>Standard DSBR event except Mlh1-independent MMR. Two independent DSBs.</td>
</tr>
</tbody>
</table>

A. Chromatid 4
Chromatid 3
Chromatid 2
Chromatid 1

B. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

C. a. NCO from DSB1, chromatid 3
b. NCO, DSB2, chromatid 1
c. NCO, DSB2, chromatid 2
A. Chromatid 1

B. Chromatid 2

Fig. S4
A.

B.
A. NCO involving chromatid 1

B. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

C. a. NCO involving chromatid 1
b. NCO, chromatids 2 and 3

<table>
<thead>
<tr>
<th>S7</th>
<th>NCO1</th>
<th>NCO2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple heteroduplex on chromatid 1</td>
<td>Large homoduplex region separating DSB site from heteroduplex tract (chromatids 2 and 3).</td>
</tr>
<tr>
<td></td>
<td>SDSA</td>
<td>Repair of double-stranded DNA gap</td>
</tr>
</tbody>
</table>
A. Chromatid 4
Chromatid 3
Chromatid 2
Chromatid 1

R2
R1
W2
W1

NCO
CO

40000
50000
60000

Branch migration following formation of double Holliday junction (dHJ)

<table>
<thead>
<tr>
<th>S8</th>
<th>CO</th>
<th>Symmetric heteroduplexes</th>
<th>Branch migration following formation of double Holliday junction (dHJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NCO</td>
<td>Strand switches of heteroduplexes on NCO chromatid, region of conversion at junction of heteroduplex</td>
<td>dHJ dissolution and region of Mlh1-independent MMR</td>
</tr>
<tr>
<td></td>
<td>CO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

DSB1

40000
50000
60000

C. a. NCO, chromatid 3
b. CO, chromatids 1 and 4

HJ dissolution
Branch migration
Mlh1-independent conversion-type repair
Processing of dHJ in CO mode
Mlh1-independent conversion-type repair

NCO,
chromatid 3

Chromatid 1
Chromatid 4
A.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

B.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

DSB1
C. a. NCO, chromatid 2

b. NCO, chromatid 1

S13

<table>
<thead>
<tr>
<th></th>
<th>NCO1</th>
<th>Heteroduplex spanning DSB site in chromatid 1</th>
<th>Extension of broken end by interaction with sister chromatid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NCO2</td>
<td>Heteroduplexes in trans on chromatid 2 separated by homoduplex</td>
<td>Dissolution of dHJ followed by Mlh1-independent MMR</td>
</tr>
</tbody>
</table>

A. W1

W2

R1

R2

B. Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

DSB1

DSB1

R

Extension of left end using sister

Second-end capture

Processing in NCO mode

Chromatid 1
Fig. S15

A.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

B.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

DSB1
C. Heteroduplexes in trans flanking DSB site

A. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

B. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

C. a. CO, chromatids 1 and 3
b. NCO, chromatids 2 and 4

<table>
<thead>
<tr>
<th>S16</th>
<th>CO</th>
<th>NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Heteroduplexes in trans flanking DSB site</td>
<td>Heteroduplex spanning DSB site on NCO chromatid 4</td>
</tr>
<tr>
<td></td>
<td>Standard CO according to DSBR model</td>
<td>Extension of broken end by interaction with sister chromatid</td>
</tr>
</tbody>
</table>
A. W1
W2
R1
R2

B. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

C. a. NCO, chromatids 2 and 4
b. NCO, chromatids 1 and 3

<table>
<thead>
<tr>
<th>S17</th>
<th>NCO1</th>
<th>Heteroduplex with interspersed conversion and restoration tracts (chromatid 3)</th>
<th>SDSA with Mlh1-independent MMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCO2</td>
<td>Simple heteroduplex (chromatid 4)</td>
<td>SDSA</td>
<td></td>
</tr>
</tbody>
</table>
A.

W1

W2

R1

R2

B.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

DSB1
Fig. S19
A.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

B.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4
Fig. S23
CO1 | CO between chromatids 1 and 3 with no heteroduplex | Standard DSBR model with limited strand invasion and limited DNA synthesis

CO2 | CO between chromatids 2 and 4 with restoration tract between trans heteroduplexes | Standard DSBR model with tract of Mlh1-independent restoration repair
**A.**

Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

**B.**

Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

**C.**

a. CO, DSB1, chromatids 2 and 4

b. NCO, DSB2, chromatids 1 and 3

Processing of dHJ in CO mode

Branch migration of left junction

MMR

Dissolution

<table>
<thead>
<tr>
<th>S26</th>
<th>CO</th>
<th>NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CO</td>
<td>Symmetric heteroduplexes; regions of homoduplex within heteroduplex; strand switch within heteroduplex</td>
</tr>
<tr>
<td></td>
<td>CO</td>
<td>CO between chromatids 2 and 4 with heteroduplex on only one chromatid</td>
</tr>
</tbody>
</table>
A.

W1

W2

R1

R2

B.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4
A. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

B. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

C.

- a. NCO, chromatids 2 and 4
- b. CO, chromatids 1 and 3

<table>
<thead>
<tr>
<th>S28</th>
<th>NCO</th>
<th>Long conversion tract spanning putative DSB site</th>
<th>Repair of double-stranded DNA gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>Heteroduplex tract on only one side of DSB site</td>
<td>Standard CO according to DSBR with one heteroduplex occurring in region without SNP</td>
<td></td>
</tr>
</tbody>
</table>
A.

W1

W2

R1

R2

B.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

DSB1
A. Chromatid 1
B. Chromatid 2

DSB1

Chromatid 3
Chromatid 4

R1
R2
W1
W2
## S34

### A. 

- **W1**: Chromatid 1
- **W2**: Chromatid 2
- **R1**: Chromatid 3
- **R2**: Chromatid 4

### B. 

- **Chromatid 1**: DSB1
- **Chromatid 2**: DSB1
- **Chromatid 3**:
- **Chromatid 4**:

### C. 

- **a. NCO, chromatid 1**: Dissolution
- **b. NCO, chromatid 2**: Restoration repair

**Table:**

<table>
<thead>
<tr>
<th>S34</th>
<th>NCO1</th>
<th>NCO2</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Long conversion-tract on chromatid 1</td>
<td>Heteroduplexes in trans on chromatid 2 separated by homoduplex</td>
<td>Repair of double-stranded DNA gap Dissolution of dHJ associated with restoration repair</td>
</tr>
</tbody>
</table>
C. S38

NCO1
Conversion tract adjacent to DSB1 site on chromatid 3
SDSA, Mlh1-independent MMR

NCO2
Heteroduplex adjacent to DSB1 site on chromatid 4
SDSA

NCO3
Heteroduplex adjacent to DSB2 site on chromatid 2
SDSA
A.  

B.  

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4
**A.** C. S41

**B.** Chromatid 1

**C.**

- **a.** CO, chromatids 1 and 3
- **b.** NCO, chromatids 2 and 4

<table>
<thead>
<tr>
<th>S41</th>
<th>NCO</th>
<th>Symmetric heteroduplexes on chromatids 2 and 4; homoduplex regions within heteroduplex</th>
<th>Branch migration; Mlh1-independent MMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>CO</td>
<td>Crossover between chromatids 1 and 3 associated with long conversion tract</td>
<td>Repair of double-stranded DNA gap</td>
</tr>
</tbody>
</table>
A. Chromatid 2

W1

W2

R1

R2

50000 60000 70000 80000

B. Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

50000 60000 70000 80000

C. a. CO, chromatids 1 and 4  

Gap repair + branch migration  

CO mode of dHJ resolution  

Restoration repair

b. NCO, chromatids 2 and 3

Restoration repair

<table>
<thead>
<tr>
<th>S43</th>
<th>CO</th>
<th>Restoration repair on one side of CO chromatid 4 and conversion repair on the other</th>
<th>Branch migration; Mlh1-independent MMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCO</td>
<td>Long heteroduplex region with short restoration tract</td>
<td>SDSA with Mlh1-independent MMR</td>
<td></td>
</tr>
</tbody>
</table>
### S44

#### A.

- Chromatid 4
- Chromatid 3
- Chromatid 2

#### B.

- Chromatid 1
- Chromatid 2
- Chromatid 3
- Chromatid 4

#### C.

- a. NCO, chromatid 1
- b. NCO, chromatid 3

<table>
<thead>
<tr>
<th>S44</th>
<th>NCO</th>
<th>Chromatid 1 has heteroduplex region with long restoration tract in the middle</th>
<th>Template switch during replication to sister strand; SDSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCO1</td>
<td>Chromatid 2 has mixture of homoduplex conversion and restoration tracts</td>
<td>Mlh1-independent patchy MMR</td>
<td></td>
</tr>
</tbody>
</table>
A. Chromatid 1

W1

W2

R1

R2

115000 120000 125000 130000 135000

B. Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

115000 120000 125000 130000 135000

C. a. NCO, chromatid 1

b. CO, chromatids 2 and 3

- Process + flip top and bottom strands

- Branch migration + elongate left end using sister chromatid

- Cleavage + gap repair

S45 NCO Simple heteroduplex (chromatid 1) SDSA

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NCO</td>
<td>Simple heteroduplex (chromatid 1)</td>
<td>SDSA</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>Regions of heteroduplex with switched strands on chromatid 3; symmetric heteroduplexes</td>
<td>Independent invasion of two broken ends; branch migration</td>
<td></td>
</tr>
</tbody>
</table>
Fig. S46

A.

B.
Fig. S47
A. Chromatid 1 and Chromatid 4

B. Chromatid 1, Chromatid 2, Chromatid 3, Chromatid 4

C. CO, chromatids 1 and 4

| S48 | CO | Regions of heteroduplex interspersed with homoduplex regions | Mlh1-independent patchy MMR |
A. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

B. Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

DSB1
S53

<table>
<thead>
<tr>
<th></th>
<th>NCO1</th>
<th>Conversion tract with no heteroduplex in chromatid 1</th>
<th>Mlh1-independent MMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCO2</td>
<td>Conversion and restoration tracts in chromatid 2</td>
<td>Mlh1-independent patchy MMR</td>
<td></td>
</tr>
</tbody>
</table>
A. Chromatid 1

B. Chromatid 2

C. a. NCO, chromatid 1
   b. NCO, chromatid 2

<table>
<thead>
<tr>
<th>S56</th>
<th>NCO1</th>
<th>Conversion tract with no heteroduplex in chromatid 1</th>
<th>Mlh1-independent MMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCO2</td>
<td>Conversion and restoration tracts in chromatid 2</td>
<td>Mlh1-independent patchy MMR</td>
<td></td>
</tr>
</tbody>
</table>
A.

B.

Chromatid 1
Chromatid 2
Chromatid 3
Chromatid 4

DSB1
C. 

a. CO, chromatids 1 and 4

b. NCO, chromatids 2 and 3

Branch migration of left junction

NCO mode of dHJ resolution

Patchy repair

### Table

<table>
<thead>
<tr>
<th>S59</th>
<th>Long conversion tract between heteroduplex and putative DSB site on chromatid 4</th>
<th>Repair of double-stranded DNA gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>Regions of conversion/restoration and heteroduplex on same side of putative DSB site in chromatids 3 and 4</td>
<td>Branch migration; NCO resolution of dHJ; Mlh1-independent patchy repair</td>
</tr>
</tbody>
</table>
C.

<table>
<thead>
<tr>
<th>S60</th>
<th>NCO1</th>
<th>NCO2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple heteroduplex. DSB on red chromatid.</td>
<td>Simple heteroduplex. DSB on blue chromatid.</td>
</tr>
<tr>
<td></td>
<td>SDSA</td>
<td>SDSA</td>
</tr>
</tbody>
</table>

A.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

B.

DSB1

DSB2

C.

a. NCO from DSB1

b. NCO from DSB2
Uni-directional heteroduplexes on chromatids 2 and 3 propagated in opposite directions

Crossover by standard DSBR model

DSB on blue chromatid, large conversion tract

Repair of double-stranded DNA gap; followed by cleavage of dHJ to yield a CO
S62

<table>
<thead>
<tr>
<th>S62</th>
<th>NCO</th>
<th>Conversion tract spanning putative DSB site in chromatid 1</th>
<th>Repair of double-stranded DNA gap; dissolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Uni-directional heteroduplexes on chromatids 2 and 3; propagated in opposite directions; interspersed conversion and restoration tracts</td>
<td>Mlh1-independent MMR</td>
</tr>
</tbody>
</table>

A.

W1

W2

R1

R2

B.

Chromatid 1

Chromatid 2

Chromatid 3

Chromatid 4

C.

a. NCO, chromatids 1 and 4

b. CO, chromatids 2 and 3

Branch migration of left junction

CO mode of dHJ resolution + patchy repair

Chromatid 1

Chromatid 4

Chromatid 3

Chromatid 2
C. NCO, chromatid 1

SDSA

Branch migration of right junction

NCO mode of dHJ resolution

<table>
<thead>
<tr>
<th>S64</th>
<th>NCO1</th>
<th>Simple heteroduplex (chromatid 1)</th>
<th>SDSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCO2</td>
<td>Heteroduplexes on same side of DSB in chromatids 2 and 4</td>
<td>Branch migration; NCO mode of dHJ resolution</td>
<td></td>
</tr>
</tbody>
</table>
A. Chromatid 4 & Chromatid 3 & Chromatid 2 & Chromatid 1

W1 & W2 & R1 & R2

35000 to 55000

B. Chromatid 1 & Chromatid 2 & Chromatid 3 & Chromatid 4

DSB1 & DSB1

35000 to 55000

C. a. NCO, chromatid 2

Extension of broken end by interaction with sister chromatid; SDSA

b. CO, chromatids 1 and 4

Extension of left red strand by sister chromatid interaction

<table>
<thead>
<tr>
<th>S65</th>
<th>CO</th>
<th>NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Heteroduplex on same side of DSB site in chromatids 1 and 4; heteroduplex spans DSB site in chromatid 4; tracts of restoration within heteroduplex in chromatid 2</td>
<td>Heteroduplex spans DSB site in chromatid 2; tracts of conversion and restoration interspersed with heteroduplex regions</td>
</tr>
<tr>
<td></td>
<td>Extension of broken end by interaction with sister chromatid; Mlh1-independent patchy repair; CO resolution of dHJ</td>
<td>Extension of broken end by interaction with sister chromatid; Mlh1-independent patchy repair; SDSA</td>
</tr>
</tbody>
</table>
**S66**

**A.**

W1

W2

R1

R2

**B.**

Chromatid 1

Chromatid 2

DSB1

Chromatid 3

DSB1

Chromatid 4

**C.**

a. NCO, chromatids 2 and 3

Invade left end

Extension of left end using sister-chromatid

Cut junctions

Invade right end

Invasion of left end

Branch migration; extend left end using sister chromatid

SDSA + second end capture

Chromatid 3

Chromatid 2

**NCO1**

Heteroduplex on chromatid 3 separated from putative DSB site by long region of homoduplex

Extension of broken end by interaction with sister chromatid, followed by SDSA

**NCO2**

Heteroduplexes on both chromatids 1 and 4; chromatid 1 has trans heteroduplexes flanking the DSB site in addition to regions of homoduplex within the heteroduplex

Invasion of right end, followed by cleavage of junction and invasion of left end; branch migration; Mlh1-independent patchy repair
C. NCO, chromatids 2 and 3

Processing of dHJ in NCO mode

Chromatid 3
Chromatid 2

Uni-directional heteroduplexes on chromatids 2 and 3 propagated in opposite directions

NCO mode of dHJ resolution with limited synthesis
Trans heteroduplexes separated by restoration tract on chromatid 1

Formation of dHJ event; dissolution followed by Mlh1-independent repair
C. Heteroduplex tract with an internal restoration tract

Mlh1-independent MMR, SDSA
### A.

- **W1**
- **W2**
- **R1**
- **R2**

**Figures:**
- **Chromatid 1**
- **Chromatid 2**
- **Chromatid 3**
- **Chromatid 4**

### B.

### C.

#### a. NCO, chromatid 4

#### b. CO, chromatids 2 and 3

<table>
<thead>
<tr>
<th>S74</th>
<th>NCO</th>
<th>Region of restoration repair separating DSB site from heteroduplex on chromatid 4</th>
<th>Mlh1-independent MMR, SDSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>Long regions of restoration and conversion repair separating DSB site from heteroduplex tract</td>
<td>Mlh1-independent MMR or template switching</td>
<td></td>
</tr>
</tbody>
</table>
S76

<table>
<thead>
<tr>
<th>S76</th>
<th>CO</th>
<th>Conversion event at the end of heteroduplex tract</th>
<th>MLh1-independent MMR, resolution of dHJ in CO mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCO</td>
<td>Displacement of heteroduplex tract from DSB site</td>
<td>Interaction of broken end with sister chromatid or long restoration tract by MLh1-independent MMR</td>
<td></td>
</tr>
</tbody>
</table>
**C.**

NCO, chromatids 2 and 4

Branch migration of right junction

NCO mode of dHJ resolution

Mismatch repair

| S77 | NCO | Symmetric heteroduplex; conversion tract at end of heteroduplex tract | Branch migration; Mlh1-independent MMR; NCO processing of dHJ |
**S78**

<table>
<thead>
<tr>
<th>NCO</th>
<th>CO</th>
<th>Regions of homoduplex separating heteroduplex region from DSB site</th>
<th>MLh1-independent MMR or template switching; resolution of dHJ in NCO mode</th>
<th>MLh1-independent MMR or gap repair; resolution of dHJ in CO mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Region of conversion separating heteroduplex region from DSB site on chromatid 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In regions centromere-proximal to event, both homologs in white sector derived from one parental homolog and both in red sector derived from the other; regions of conversion and restoration homoduplexes on chromatid 1. Crossover on same chromosomes located centromere-proximal to the event in S79 (described in S78) produced centromere-proximal regions. Homoduplex regions produced by template switching or by Mlh1-independent MMR.
A. 

W1

W2

R1

R2

B. 

Chromatid 1

Chromatid 2

DSB1

Chromatid 3

Chromatid 4
**S81**

**A.**

- chromatids 1 and 4
- Extension of broken end by interaction with sister chromatid; Mlh1-independent restoration repair; resolution of dHJ in CO mode

**B.**

- Chromatid 1
- Chromatid 2
- Chromatid 3
- Chromatid 4

**C.**

- a. CO, chromatids 1 and 4
- Extension of left end by sister chromatid
- Strand invasion
- Processing of dHJ in CO mode; MMR

- b. NCO, chromatids 2 and 3
- Branch migration
- Processing of dHJ in NCO mode

<table>
<thead>
<tr>
<th>S81</th>
<th>CO</th>
<th>NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Long tracts of homoduplex on chromatids 1 and 4.</td>
<td>Heteroduplex DNA on same side of DSB site in NCO chromatids</td>
</tr>
<tr>
<td></td>
<td>Extension of broken end by interaction with sister chromatid; Mlh1-independent restoration repair; resolution of dHJ in CO mode</td>
<td>Branch migration followed by processing of dHJ in CO mode</td>
</tr>
</tbody>
</table>
A. Heteroduplex with interspersed conversion and restoration tracts (chromatid 1); initiated at DSB1

B. Symmetric heteroduplex tracts; heteroduplex tract interspersed with homoduplex regions; strand switch on chromatid 3; initiated at DSB2

C. a. CO, chromatids 1 and 4, DSB1

\[\text{Processing of dHJ in CO mode}\]

\[\text{Branch migration}\]

\[\text{MMR}\]

\[\text{Branch migration; Mlh1-independent MMR; dissolution of dHJ}\]

<table>
<thead>
<tr>
<th>S82</th>
<th>CO</th>
<th>Heteroduplex with interspersed conversion and restoration tracts (chromatid 1); initiated at DSB1</th>
<th>Mlh1-independent MMR; processing of dHJ in CO mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCO</td>
<td>Symmetric heteroduplex tracts; heteroduplex tract interspersed with homoduplex regions; strand switch on chromatid 3; initiated at DSB2</td>
<td>Branch migration; Mlh1-independent MMR; dissolution of dHJ</td>
<td></td>
</tr>
</tbody>
</table>
C. Strand switch of heteroduplex in CO chromatid 4

Invasion of the right broken end, followed by processing of junction; extension of right end by sister-chromatid interaction; invasion of the left end and processing dHJ in crossover mode.

<table>
<thead>
<tr>
<th>S83</th>
<th>CO</th>
<th>NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strand switch of heteroduplex in CO chromatid 4</td>
<td>DSB on red chromatid, but red chromatid acts as donor</td>
</tr>
<tr>
<td></td>
<td>Invasion of the right broken end, followed by processing of junction; extension of right end by sister-chromatid interaction; invasion of the left end and processing dHJ in crossover mode</td>
<td>Following strand invasion, junction cleaved before initiating DNA synthesis</td>
</tr>
</tbody>
</table>
### A. 

- **W1**
- **W2**
- **R1**
- **R2**

### B. 

- **Chromatid 1**
- **Chromatid 2**
- **Chromatid 3**
- **Chromatid 4**

### C. 

- **a. CO, chromatids 1 and 4**
- **b. NCO, chromatids 2 and 3**

<table>
<thead>
<tr>
<th>S84</th>
<th>CO</th>
<th>NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Long conversion tract spanning DSBs in both CO chromatids 1 and 4; heteroduplex in chromatid 1 interrupted by restoration tracts</td>
<td>NCO chromatid 3 has strand switch of heteroduplexes; conversion event within heteroduplex</td>
</tr>
<tr>
<td></td>
<td>Gap repair; Mlh1-independent MMR; resolution of dHJ in CO mode</td>
<td>Resolution of dHJ by dissolution; Mlh1-independent MMR</td>
</tr>
</tbody>
</table>
**A.**

- Chromatid 4
- Chromatid 3
- Chromatid 2
- Chromatid 1

**B.**

- Chromatid 1
- Chromatid 2
- Chromatid 3
- Chromatid 4

<table>
<thead>
<tr>
<th>S85</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>Strand switch in CO chromatid 1; heteroduplexes in trans on chromatids 1 and 4; long conversion tract adjacent to heteroduplex region in chromatid 1</td>
</tr>
<tr>
<td>NCO</td>
<td>Simple heteroduplex</td>
</tr>
</tbody>
</table>

**C.**

- a. NCO, chromatids 2 and 3
- b. CO, chromatids 1 and 4

- Invasion of right end, followed by branch migration and cutting of junction.
- Extension of right end by interaction with sister chromatid; invasion of left end and resolution of dHJ in CO mode
- Cleavage, extension of right end using sister chromatid, invasion of left end
- Cleavage in CO mode
Strand switches in heteroduplexes in both CO chromatids 1 and 4; both chromatids have homoduplex regions interspersed with heteroduplex
**A.**

- Chromatid 4
- Chromatid 2

**W1**

- Conversion tract adjacent to heteroduplex

**W2**

- Conversion tract adjacent to heteroduplex

**R1**

- Conversion tract adjacent to heteroduplex

**R2**

- Conversion tract adjacent to heteroduplex

**B.**

- Chromatid 1
- Chromatid 2
- Chromatid 3
- Chromatid 4

- DSB1

**C.**

- a. NCO, chromatids 2 and 3
- b. CO, chromatids 1 and 4

**DSB1**

- Conversion tract distal to heteroduplex tract on chromatid 4

**SDSA**

- Repair of large gap associated with HS4 hotspot; processing dHJ in CO mode; MLh1-independent MMR

**MMR**

- Repair of large gap; SDSA; MLh1-independent MMR

---

<table>
<thead>
<tr>
<th>S87</th>
<th>CO</th>
<th>NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large region of conversion spanning putative DSB site; uni-directional heteroduplexes on chromatids 1 and 4 propagated in opposite directions; conversion tract distal to heteroduplex tract on chromatid 4</td>
<td>Region of conversion spanning putative DSB site; conversion tract adjacent to heteroduplex</td>
</tr>
</tbody>
</table>
**S88**

<table>
<thead>
<tr>
<th></th>
<th>CO</th>
<th>NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Region of conversion spanning putative DSB site; unidirectional heteroduplex tracts in on chromatids 1 and 4 propagated in different directions; multiple homoduplex tracts within heteroduplex tract on chromatid 4</td>
<td>Large conversion tract spanning putative DSB site; chromatid 3 has a pattern of heteroduplex and homoduplex tracts that is very similar to that of chromatid 4</td>
</tr>
<tr>
<td></td>
<td>Repair of large gap; patchy Mlh1-independent MMR; resolution of dHJ in CO mode</td>
<td>Repair of large gap; chromatid 4 CO chromatid used as template for part of repair; also, switch of repair templates to sister chromatid</td>
</tr>
</tbody>
</table>
**A.**

<table>
<thead>
<tr>
<th>Chromatid</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromatid 1</td>
<td>DSB1</td>
</tr>
<tr>
<td>Chromatid 2</td>
<td>DSB1</td>
</tr>
<tr>
<td>Chromatid 3</td>
<td></td>
</tr>
<tr>
<td>Chromatid 4</td>
<td></td>
</tr>
</tbody>
</table>

**B.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Repair of large gap; resolution of dHJ in CO mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very large conversion tract spanning putative DSB site; heteroduplex on chromatid 1 but not 4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Repair of large gap; resolution of dHJ in NCO mode; Mlh1-independent MMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very large conversion tract spanning putative DSB site; restoration tract in middle of heteroduplex</td>
<td></td>
</tr>
</tbody>
</table>
**Table: Repair of large double-stranded DNA gap, resolution of dHJ in CO mode**

<table>
<thead>
<tr>
<th>S90</th>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very large conversion tract spanning DSB site; no heteroduplexes observed</td>
<td>Repair of large double-stranded DNA gap, resolution of dHJ in CO mode</td>
</tr>
<tr>
<td>NCO</td>
<td>Heteroduplexes in both NCO chromatids 2 and 3 on same side of DSB site; homoduplex tracts in heteroduplex</td>
<td>Invasion of broken end, followed by branch migration; resolution of dHJ structure in NCO mode with regions of Mlh1-independent MMR</td>
</tr>
</tbody>
</table>
**A.** Chromatid 3

**B.** Chromatid 1

**C.**

<table>
<thead>
<tr>
<th></th>
<th>S91</th>
<th>CO</th>
<th>NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Heteroduplexes on both chromatids 1 and 4 on same side of putative DSB site; large conversion tract flanking DSB site</td>
<td>Invasion of right broken end, followed by synthesis off of homolog; template switch to sister chromatid, and then re-invasion of sister chromatid; resolution of dHJ in CO mode</td>
<td>Large conversion tract spanning putative DSB site</td>
</tr>
</tbody>
</table>

**S91**

- **CO**
  - Chromatids 1 and 4 on same side of putative DSB site; large conversion tract flanking DSB site
  - Invasion of right broken end, followed by synthesis off of homolog; template switch to sister chromatid, and then re-invasion of sister chromatid; resolution of dHJ in CO mode

- **NCO**
  - Large conversion tract spanning putative DSB site
  - Repair of large gap; SDSA