

**Table S1**

<b>Cell line</b>	<b>Feature</b>
<i>LIG1</i> <sup>-/-</sup>	<i>LIG1</i> knockout
<i>LIG3</i> <sup>-/2loxP</sup>	<i>LIG3</i> conditional knockout
<i>LIG3</i> <sup>-/</sup> *	<i>LIG3</i> knockout
<i>LIG3</i> <sup>-/M2I</sup>	nuclear <i>LIG3</i> knockout
<i>LIG4</i> <sup>-/-</sup>	<i>LIG4</i> knockout
<i>LIG1</i> <sup>-/-</sup> <i>LIG4</i> <sup>-/-</sup>	<i>LIG1</i> knockout; <i>LIG4</i> knockout
<i>LIG3</i> <sup>-/2loxP</sup> <i>LIG4</i> <sup>-/-</sup>	<i>LIG3</i> conditional knockout; <i>LIG4</i> knockout
<i>LIG3</i> <sup>-/</sup> <i>LIG4</i> <sup>-/</sup> *	<i>LIG3</i> knockout; <i>LIG4</i> knockout
<i>LIG3</i> <sup>-/M2I</sup> <i>LIG4</i> <sup>-/-</sup>	nuclear <i>LIG3</i> knockout; <i>LIG4</i> knockout
<i>LIG3</i> <sup>-/</sup> <i>Cdc9</i>	<i>LIG3</i> knockout overexpressing <i>CDC9</i> (yeast <i>LIG1</i> )
<i>LIG3</i> <sup>-/2loxP</sup> <i>hLIG3α</i>	<i>LIG3</i> conditional knockout overexpressing human nuclear <i>LIG3α</i>
<i>LIG3</i> <sup>-/</sup> <i>hLIG3α</i> *	<i>LIG3</i> knockout overexpressing human nuclear <i>LIG3α</i>
<i>LIG3</i> <sup>-/2loxP</sup> <i>LIG4</i> <sup>-/-</sup> <i>mts-hLIG1</i>	<i>LIG3</i> conditional knockout; <i>LIG4</i> knockout overexpressing human mitochondrial <i>LIG1</i>
<i>LIG3</i> <sup>-/</sup> <i>LIG4</i> <sup>-/-</sup> <i>mts-hLIG1</i> *	<i>LIG3</i> knockout; <i>LIG4</i> knockout overexpressing human mitochondrial <i>LIG1</i>

\* Conditional allele deleted by 4HT treatment of parental cell line.