

## **Description of Additional Supplementary Files**

### **Supplementary Data 1:**

Sequence of oligonucleotides used to clone DDR-CRISPR library.

### **Supplementary Data 2:**

Results of DDR-CRISPR screens in *WT*, *Polq*<sup>-/-</sup> and *Polq*<sup>hPOLQ</sup> cells by our Völundr. Tab 1 named Gene List: Gene Abundance Change Scores and Kolmogorov-Smirnov p-values.

Significant genes are listed in blue, non-significant genes are listed in grey. Tab 2 named Gene Categories: Category membership of genes. Used to generate figure 1e.

### **Supplementary Data 3:**

Tab 1 named DDR-Polm: Results of DDR-CRISPR screens in *WT* and *Polm*<sup>-/-</sup> cells using the Völundr pipeline. Tab 2 named Membrane-Polq: Results of membrane-CRISPR screens in *WT* and *Polq*<sup>-/-</sup> cells using Völundr. Significant genes are listed in blue, non-significant genes are listed in grey.

### **Supplementary Data 4:**

TCGA human data, named tcga\_brca\_polqSL\_mutations: list of PolqSL gene mutation in each TCGA sample.

### **Supplementary Data 5:**

TCGA human data, named tcga\_brca\_mhd\_cosmic3: List of MHD, COSMIC3 score, and PolqSL mutation status for each TCGA sample.

### **Supplementary Data 6:**

TCGA human data, named tcga\_brca\_mhd\_wgs\_wes: Same list as above but for the TCGA samples that also had wgs done with MHD\_WGS scores

### **Supplementary Data 7:**

Oligonucleotide Sequences, Probe Sequences and Miscellaneous sgGuide sequences used in the study.