

## Description of Additional Supplementary Files

**File name:** Supplementary Data 1

**Description:** Pro-N6pA significantly enriched proteins; Summary of significantly enriched proteins in studied cell types.

**File name:** Supplementary Data 2

**Description:** Olaparib treatment; Table of enriched proteins from HeLa cells treated with Olaparib and pro-N6pA probe.

**File name:** Supplementary Data 3

**Description:** ADP-ribosylation reference list; Reference list of the known ADP-ribosylated proteins.

**File name:** Supplementary Data 4

**Description:** AMPylation sites; Table of all identified AMPylation sites.

**File name:** Supplementary Data 5

**Description:** Previously identified AMPylated proteins; Reference list of previously identified AMPylated proteins.

**File name:** Supplementary Data 6

**Description:** FICD OX and KD\_HeLa; Table of enriched proteins from HeLa cells overexpressing FICD and FICD knockdown HeLa cells.

**File name:** Supplementary Data 7

**Description:** FICD interacting proteins; Table of enriched FICD interacting proteins by using DSSO crosslinking reagent.

**File name:** Supplementary Data 8

**Description:** Chemical-proteomics complete result files; Table containing complete lists of MaxQuant identified proteins from chemical-proteomic experiments.

**File name:** Supplementary Data 9

**Description:** Cellular localization of AMPylated proteins; Table describing subcellular localization of enriched proteins.

**File name:** Supplementary Data 10

**Description:** FICD OX and KD\_SH-SY5Y whole proteome; Table summarizing the whole proteome analysis from SH-SY5Y cells transiently overexpressing FICD and FICD knockdown SH-SY5Y cells.

**File name:** Supplementary Data 11

**Description:** FICD OX\_SH-SY5Y enrichment; Table of enriched proteins from SH-SY5Y cells transiently overexpressing FICD and FICD knockdown SH-SY5Y cells.

**File name:** Supplementary Data 12

**Description:** GO Terms; Complete lists of GO term analyses.