## **Description of Additional Supplementary Files**

File Name: Supplementary Data 1

**Description:** Raw data of O-GlcNAz sites identified with 1,3-Ac<sub>2</sub>GalNAz in HeLa cells.

**File Name:** Supplementary Data 2 **Description:** Raw data of S-HexNAz sites identified with 1,3-Ac<sub>2</sub>GalNAz in HeLa cells.

**File Name:** Supplementary Data 3 **Description:** Raw data of S-AcHexNAz sites identified with 1,3-Ac2GalNAz in HeLa cells.

**File Name:** Supplementary Data 4 **Description:** Raw data of O-GlcNAz sites identified with 1,3-Pr<sub>2</sub>GalNAz in HeLa cells.

**File Name:** Supplementary Data 5 **Description:** Raw data of S-HexNAz sites identified with 1,3-Pr<sub>2</sub>GalNAz in HeLa cells.

File Name: Supplementary Data 6

**Description:** Raw data of S-PrHexNAz sites identified with 1,3-Pr<sub>2</sub>GalNAz in HeLa cells.

File Name: Supplementary Data 7

**Description:** Raw data of gene expression analysis in mESCs stably expressing WT and S25A ESRRB by RNA sequencing.