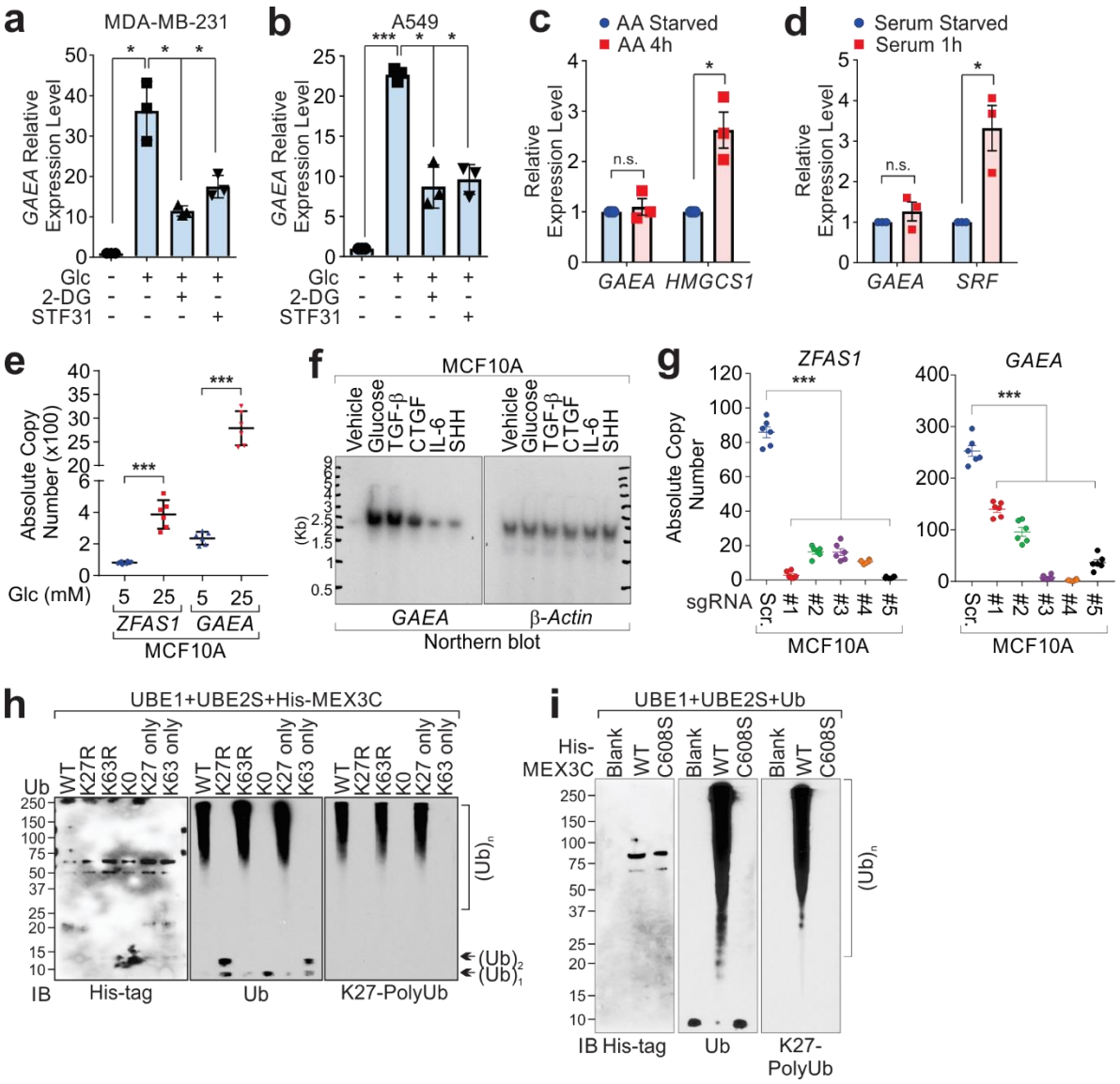

Figure S1: Identification and characterization of *GAEA*.

(**a**, **b**) RT-qPCR detection of *GAEA* expression in MDA-MB-231 cells (a) and A549 cells (b) with indicated treatments. Error bars, SD, n=3 independent experiments. Student's t-test. (**c**, **d**) RT-qPCR detection of *GAEA* expression in MDA-MB-231 cells with indicated treatments, *HMGSC1* (c) and *SRF* (d) as a positive control respectively. Error bars, SD, n=3 independent experiments. Student's t-test. (**e**) RNA copy number measurement of indicated lncRNAs of MCF10A cells with glucose starvation followed by low (5 mM) or high (25 mM) glucose (Glc) stimulation. Error bars,

SD, n=3 independent experiments. Student's t-test. (**f**) Northern blot detection of *GAEA* (left) or *β-Actin* (right) of MCF10A cells in the presence of indicated stimuli. (**g**) RNA copy number measurement of *ZFAS1* (left) or *GAEA* (right) in MCF10A cells harboring indicated sgRNAs. Error bars, SD, n=6 independent experiments, one-way ANOVA. (**h**) *In vitro* ubiquitination assay was performed with recombinant UBE1-UBE2S-MEX3C in the presence of ubiquitin or indicated mutants, and immunoblotted with indicated antibodies. (**i**) *In vitro* ubiquitination assay was performed with UBE1-UBE2S-MEX3C in the presence of MEX3C (WT or indicated mutants). (n.s. $p>0.05$, *$p<0.05$, **$p<0.01$, and ***$p<0.001$).