**Supplemental Figure Legends**

**Figure S1.**  Characterization of ZNF592-NUT fusion in UNC. **A**, Dual-color, bring-together FISH of *BRD4-NUT* (Green, 3’ of *NUT*; Red, 5’ of *BRD4*) and *BRD3-NUT* (Green, 3’ of *NUT*; Red, 5’ of *BRD3*); split-apart assay of *NSD3* (Green, 3’; red, 5’) and *ZNF532* (Green, 3’; red, 5’) performed on FFPEsection of*ZNF592-NUT*-positive UNC tumor taken from the patient's pelvic bone. The image of *BRD4-NUT* fusion FISH was taken in the Center for Advanced Molecular Diagnostics at Brigham and Women’s Hospital, Boston. The remaining images were taken as described in supplemental materials and methods (magnification: 1000x, scale bar: 5 µm.). **B**, Negative control dual-color FISH using "bring-together" probes of *NUT* and *ZNF592* (as in **Fig. 1C**) was performed on the *BRD4-NUT*-positive NC cell line TC-797 (magnification: 1000×, scale bar = 10 µm.) **C**, IF performed on FFPE sections of *ZNF592-NUT*-positive UNC tumor using anti-NUT and anti-H3K27ac (magnification: 1000×, scale bar = 10 µm).

**Figure S2.** Immunoblot of U2OSTRex-FLAG-BRD4-NUT cells treated with ethanol or tetracycline for 36 hours as in **Fig. 2C** using anti-ZMYND8, anti-ZNF592, anti-NUT antibodies (visualizing FLAG-BRD4-NUT). Tubulin was used as a loading control.

**Figure S3.** ZNF532 knock down using bi-allelic genomic BioTAP tag. **A**,Strategy used to insert BioTAP tag by CRISPR/Cas9 and a guide RNA targeting the start codon of ZNF532 (red, left); and PCR performed on the genomic DNA of an isolated clone of 797-ZNF532-NBioTAP demonstrating homozygosity (right). **B**, RT-qPCR performed on TC797 or 797-ZNF532-NBioTAP cells 48h following siCTRL or siBioTAP transfection. Error bars represent standard deviation (SD) from three biological replicates. \*p < 0.01, student’s t test.