Supplemental Figure Legends

Supplemental Figure 1.

Generation of the mouse model with adipocyte-specific *Becn1* deletion. (A) Gene targeting strategy for adipocyte-specific deletion of *Becn1*. The knockout-first allele (tm1a) of *Becn1* contains a lacZ trapping cassette and a neo cassette inserted into the *Becn1* intron 3. The floxed allele of *Becn1* was generated by crossing *Becn1*$^{tm1a(KOMP)Wtsi}$ mice with β-actin-*Flpe* transgenic mice, leaving loxP sites on either side of exons 4-7. The resultant mice were then crossed with Adipoq-*Cre* transgenic mice to delete exons 4-7 of the floxed allele. Deletion of *Becn1* causes a frameshift leading to a premature stop codon. E, exon; Neo, neomycin gene. (B) Validation of gene targeting by genotyping analysis. Genomic DNA from mouse tails was amplified using primers specific for the indicated genotypes. Amplified PCR products were resolved on an agarose gel. WT allele, 156 bp; tm1a allele, 491 bp; floxed allele, 259 bp. (C) The percentage changes in the eWAT mass of WT and AKO mice at the indicated time points (n = 3-10). (D, E) Food and drink intake from WT and AKO mice (n = 6). Data are presented as mean ± SEM. ns, not significant; *p < 0.05; ***p < 0.001.

Supplemental Figure 2.

Adipocyte *Becn1* deficiency promotes adipose tissue inflammation upon high fat diet (HFD). (A) Body weight changes in HFD-fed WT and AKO mice (n = 8). (B) Left panel: Representative images of iWAT and eWAT from HFD-fed WT and AKO mice after 10 weeks of HFD feeding. Scale bar, 1 cm. Right panel: Tissue weight of the BAT, iWAT and eWAT from HFD-fed WT and AKO mice after 10 weeks of HFD feeding (n = 5). (C-E) Indirect calorimetry analysis of HFD fed (4weeks) mice (n = 4) since 4 weeks of age. Data analyzed by Korea Mouse Phenotyping Center (KMPC) using metabolic cage (TSE phenomaster). Means ± s.d. are

presented by the bar graph. (F-G) Intraperitoneal glucose tolerance test (GTT) insulin tolerance test (ITT), and area under the curve (AUC) (n = 5~6). (H) Representative immunofluorescence images of iWAT from 12-week-old WT and AKO mice after 4 weeks of HFD feeding. The iWAT sections were stained with PLIN (green), CD11b (cyan), and CD11c (red) antibodies. Nucleus was stained with DAPI (blue). Scale bar, 100 μm. (I-J) Total number of macrophages $F4/80^{+}CD11b^{+}$ in SVCs per gram of eWAT and iWAT were determined by flow cytometry in WT and AKO mice after 4 weeks of HFD feeding (*n* = 3~4). (K) The percentages of $CD11c^{+}$ in $F4/80^{+}CD11b^{+}$ cells were measured by flow cytometry in SVCs, isolated from iWAT of WT and AKO mice after 4 weeks of HFD feeding (*n* = 3~4). (L) The ratio of M1 to M2 (M1/M2) in the SVCs, isolated from iWAT of WT and AKO mice after 4 weeks of HFD feeding (*n* = 3~4). The M1/M2 ratio was calculated as the percentage of M1 ($CD11c^{+}$) population in $F4/80^{+}CD11b^{+}$ cells divided by the percentage of M2 ($CD11c^{-}CD206^{+}$) population in $F4/80^{+}CD11b^{+}$ cells. Data are presented as mean ± SEM. ns, not significant; *p < 0.05; **p < 0.01; ***p < 0.001.

Supplemental Figure 3.

Increased rupture of adipocytes with debris in *Becn1*-deficient adipocytes. Morphological changes in the adipose SVCs derived from WT and AKO mice at the indicated times after adipogenic differentiation. Oil red O staining of the adipose SVCs derived from iWAT of WT and AKO mice after inducing adipogenic differentiation for 12 days. Scale bar, 100 μm.

Supplemental Figure 4.

imSVC adipocyte differentiation and ER stress induction. (A) Schematic of imSVC adipocyte differentiation. BECN KO efficiency upon 4-OHT treatment shown by RT-qPCR and

Western Blot analysis. (B) Semi-quantitative RT-PCR of spliced and unspliced XBP1 mRNA from imSVC cDNA. Proportion of Xbp1 spliced to unspliced was visualized using *ImageJ.* (C) TUNEL assay of ER stress induced by serum deprivation and alleviation by treating TUDCA (400 μM). Images acquired using ZEISS 880 microscopy 40x magnifying lens. Data are presented as mean ± SEM. #p = 0.0811; *p < 0.05; **p < 0.01; ***p < 0.001.

Supplemental Figure 5.

Ablated mitophagy and dysfunctional mitochondria in *Becn1*-deficient adipocytes (A-B) mito-Keima transfected and fluorescence detected using microscopy and FACS analysis. Scale bar, 10 μm. (C) Representative immunofluorescence images of TMRE staining of iWAT from 8 weeks old WT and AKO mice. Scale bar, 10 μm. (D) Representative immunofluorescence images of JC-1 staining of iWAT from 8 weeks old WT and AKO mice. Scale bar, 10 μm. (E) Transmission electron microscope (TEM) analysis of eWAT from 10-week-old WT and AKO mice. Yellow arrows indicate the ruptured mitochondrial matrix. Scale bar, 1 μm. (F) Number of mitochondria counted from each adipocyte from TEM image of 10-week-old WT and AKO mice eWAT (n = 4). Data are presented as mean ± s.d. **p < 0.01