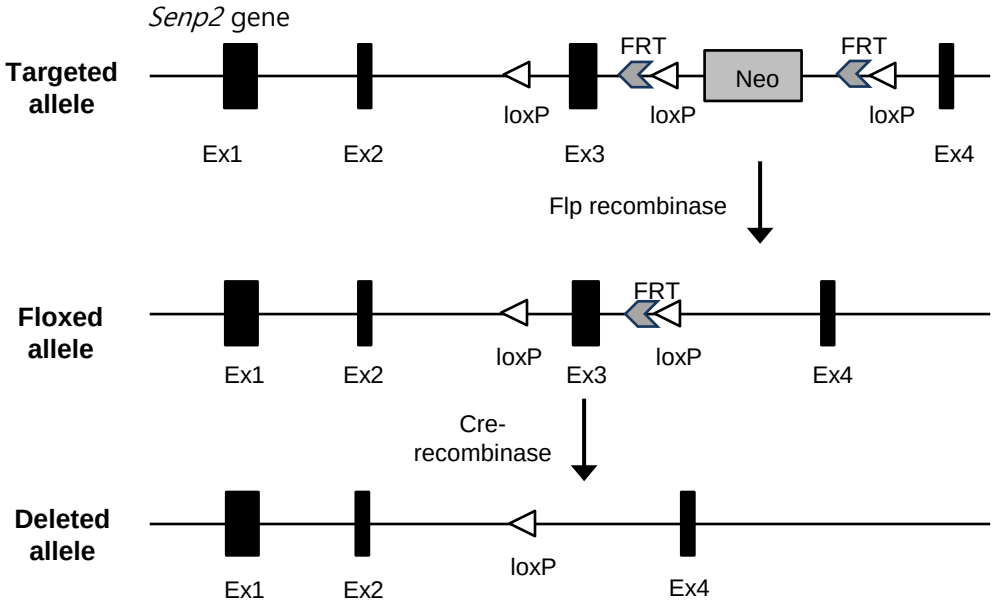
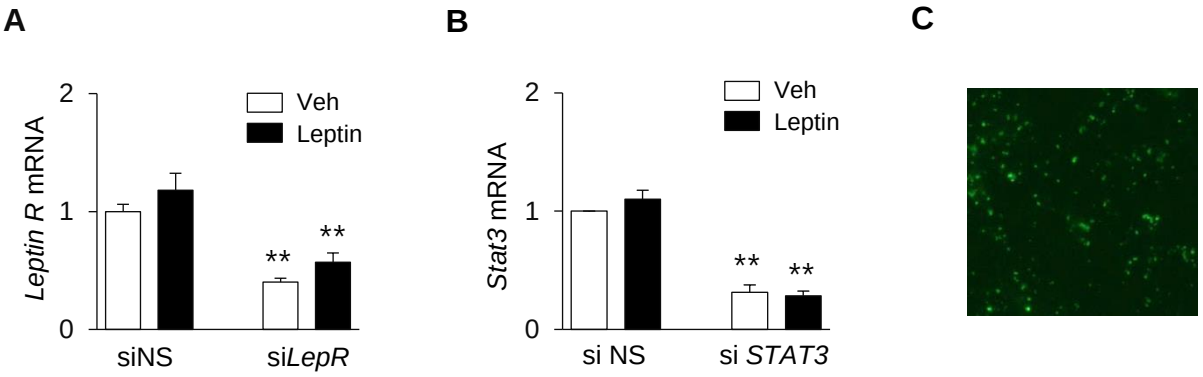
Supplemental Figure 1



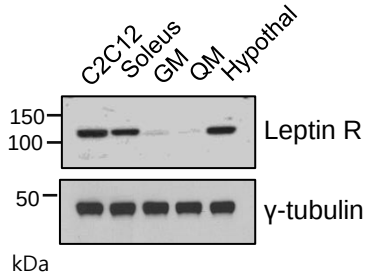
Supplemental Figure 1. Generation of tissue-specific SENP2 knockout mice
The exon 3 of mouse *Senp2* gene was finally deleted in skeletal muscle after mating with MCK-*Cre* mice.

Supplemental Figure 2



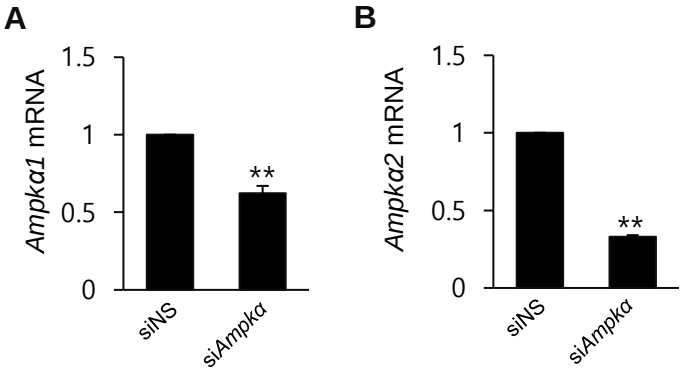
Supplemental Figure 2. Knockdown of leptin receptor and STAT3
(A) C2C12 myotubes were transfected with siRNAs, siNS (nonspecific) or si*LepR* (leptin receptor, 100 nM)) for 24 h, and then treated with leptin (100 ng/mL) for another 24 h. (**B)** C2C12 myotubes were transfected with siRNAs, siNS (nonspecific) or si*Stat3* (100 nM), for 24 h, and then treated with leptin for another 24 h. The mRNA levels in the siNS/Veh treated cells were expressed as 1, and the others were expressed as its relative values (n = 3). Data are presented as mean ± SEM. $^{**}P < 0.01$ vs. siNS (C) siFITC (50 nM) (*AccuTarget*™ Fluorescein-labeled Negative Control siRNA, Bioneer, Korea) was transfected into C2C12 myotubes to check the efficiency of siRNA transfection.

Supplemental Figure 3



Supplemental Figure 3. Expression of leptin receptor in muscles Lysates of C2C12 myotubes, several types of muscles (soleus, gastrocnemius (GM), and quadriceps (QM)), and hypothalamus were subjected to western blot analysis using an anti-leptin receptor (Leptin R) antibody.

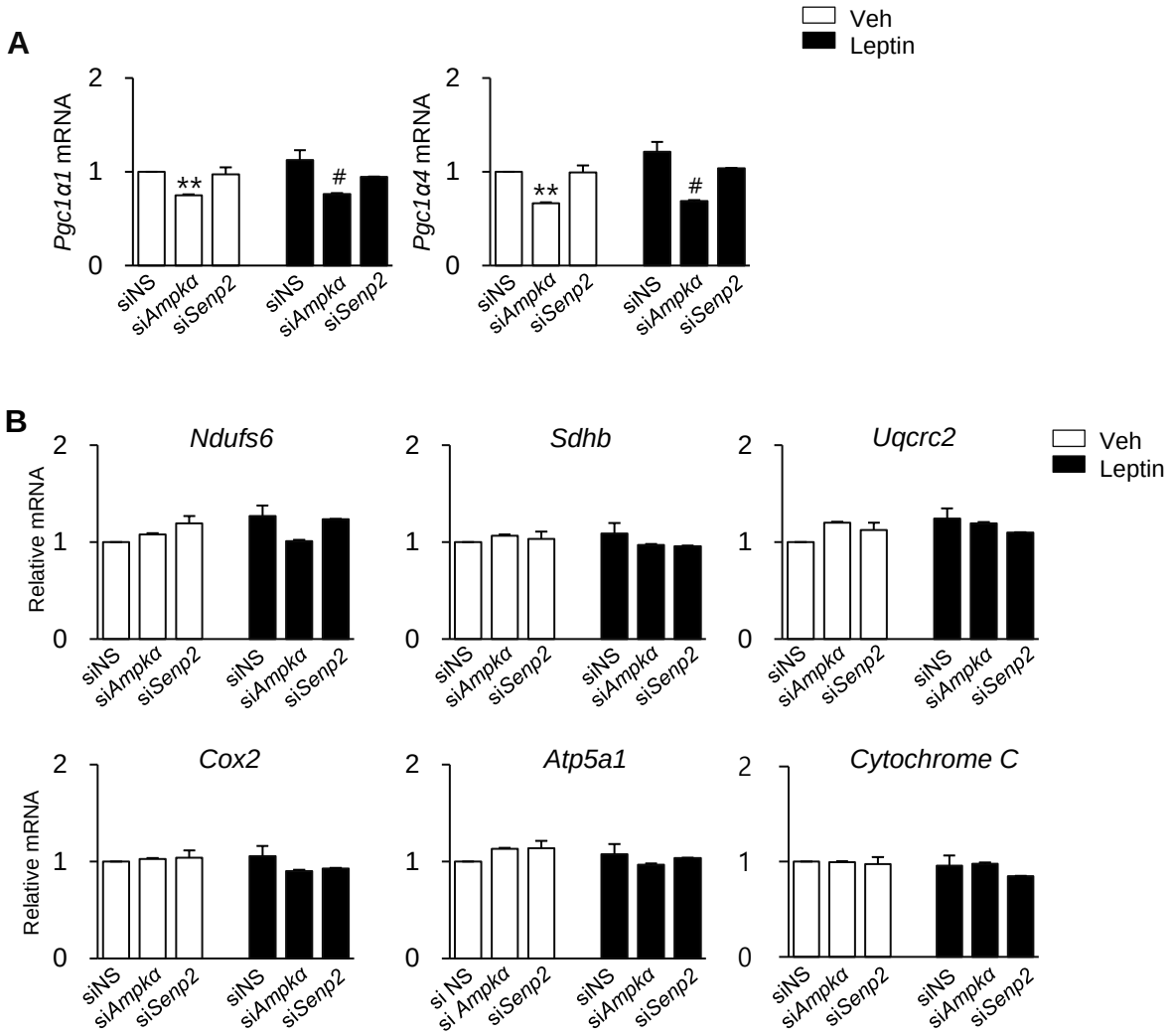
Supplemental Figure 4

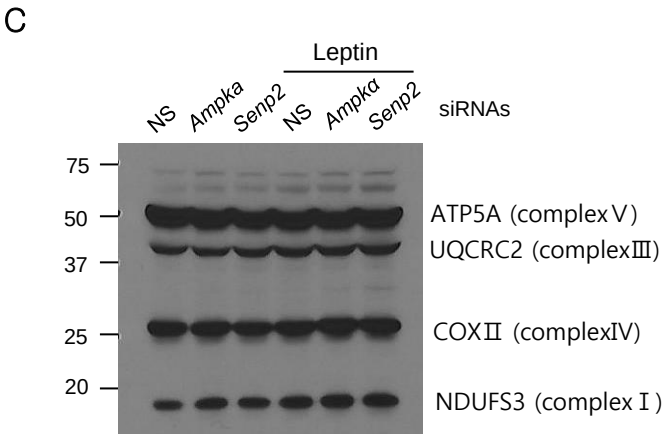


Supplemental Figure 4. Knockdown of Ampkα1 and Ampkα2 by siAMPKα

(A-B) C2C12 myotubes were transfected with siNS (nonspecific) or si*Ampkα* (50 nM)) for 48 h. The mRNA levels in the siNS treated cells were expressed as 1, and the others were expressed as its relative values (n = 3). Data are presented as mean ± SEM. $^{**}P < 0.01$ vs. siNS

Supplemental Figure 5





Supplemental Figure 5. Effects of knockdown of Ampkα or Senp2 on mitochondria

(A-C) C2C12 myotubes were transfected with siNS (nonspecific), si*Ampkα* or si*Senp2* (50 nM)) for 24 h, and then treated with leptin (100 ng/mL) for another 24 h. (A,B) The mRNA levels in the siNS/Veh treated cells were expressed as 1, and the others were expressed as its relative values (n = 3). Data are presented as mean ± SEM. $^{**}P < 0.01$ vs. siNS, $\#P < 0.01$ vs siNS/Leptin (C) Western blotting was performed using MitoProfile Total OHPHOS antibody cocktail (MitoSciences, Eugene, OR)

Supplemental Table 1

A

	Forward primers	Reverse primers
Senp2	5′ GCT GGC TAA GGT TCT CGG C 3′	5′ CTG GGA TCT CAT CAG TGT CCA 3′
Cpt1b	5′ AAG TGT AGG ACC AGC CCC GA 3′	5′ TGC GGA CTC GTT GGT ACA GG 3′
Acsl1	5′ CTG GTT GCT GCC TGA GCT TG 3′	5′ TTG CCC CTT TCA CAC ACA CC 3′
Ucp3	5′ AGG AGC CAT GGC AGT GAC CT 3′	5′ CAC AGG CCC CTG ACT CCT TC 3′
Stat3	5′ AGA GCC CCA TCT GTC CTC TC 3′	5′ ACT GGT AGT CTG CAA AAC CAA A 3′
Leptin Rb	5′ GCA TGC AGA ATC AGT GAT ATT TGG 3′	5′ CAA GCT GTA TCG ACA CTG ATT TCT TC 3′
Gapdh	5′ AGG TCG GTG TGA ACG GAT TTG 3′	5′ TGT AGA CCA TGT AGT TGA GGT CA 3′
Cpt1b PPRE (ChIP)	5' GAG CAG CAG TGG TCC CTG AG 3'	5' TGC TGG AAG GTC TGG GAC TG 3'
Acsl1 PPRE (ChIP)	5′ GGT GAC TCT ACT CTC AGC TGC 3′	5′ CTT ACC AGG CTG CCA AGG TCT 3′

B

	EMSA Oligomers
consensus	5′ GAT CCT TCC AGG AAC CTA GAT C 3′
self	5′ CTA CAA AGT GAG TTC CAG GAC AGT CAG GGC 3′
mutant	5′ CTA CAA AGT GAG TTA AAG GAC AGT CAG GGC 3′

C

	siRNA 1	siRNA 2	siRNA 3	siRNA 4
siLepR	UAUCUACGUUCCUGAGUUA	GAAACUGACGGGUACUUAA	GAUGGAAUGAAGUGGCUUA	CAACUACGCUCUUCUGAUG
siStat3	CUCAGAGGGUCUCGGAAAU	CCGCCAACAAAUUAAGAAA	GAGUUGAAUUAUCAGCUUA	CAGUUUACCACGAAAGUCA
siSenp2	GGACAAACCUAUCACAUUC	GAAGAACAGUCUCUACAAU		
siAmpka	UGCUUUAGCUCGUUGAUUA	CCAGAUGAACGCUAAGAUA	GUUUAGAUGUUGUUGGAAA	ACGAGAACAUGAAUGGUUU

Supplemental Table 1. Sequence of the primers and siRNAs
(A) Primers for real-time qPCR and ChiP-coupled qPCR
(B) Oligonucleotides for EMSA
(C) Sequence of siRNAs