

Supple Figure 1: PIMP2-KO mice have similar metabolism as controls.

- A. The body weight of HFD-fed animals
B. Body length C. food intake D. the energy expenditure (EE) E. Physical activity From 30-weeks-old HFD fed control and PIMP2-KO male mice (n=8 pairs).

Data are means \pm SD. T test.

Supple Figure 2: The IMP2 deletion in MSCs reduces mature adipocyte number on NCD.

- A. The lean and fat body mass of 30-week-old male mice fed on NCD.
B. The glucose tolerance test of ove-night fast, 12-week-old male mice.
C. The insulin tolerance test of 5-hour fast, 14-week-old male mice.
D. Fat pad weight E. mature adipocytes cell number F. mature adipocyte cell size of 30-weeks-old NCD fed male mice (n=6 pairs). G: gonadal fat; S: subcutaneous fat.

Data are means \pm SD. T test. *P<0.05 **P<0.01

Supple Figure 3: The CD24⁺ cells from P-IMP2 KO mice showed normal proliferation and differentiation.

The WAT depots excised from 4-week-old male mice were digested and equal numbers of CD24⁺ cells were distributed into 24 well plates. Cells were cultured for 7 days and adipocyte differentiation was induced. Control (Black); PIMP2-KO (red)

- A. The cell proliferation of CD24⁺ cells.
B. The triglyceride content of terminal differentiated cells.

Data are means \pm SD. T test. **P<0.01 G: gonadal WAT S: subcutaneous WAT

Supple Figure 4: The 3'-UTR regions near *FZD8* mRNA stop codons. The conserved m6A binding sites wild type (black) and mutant (red).

Supple Figure 5: Inhibition of FDZ8 rescues the impaired adipogenesis of IMP2 null ADSCs.

- A. The Oil red O staining of NSC654259 treated ADSCs isolated from 4 weeks old HFD-fed control and P-IMP2 mice.

B. The relative *Ppar γ* and *Cepba* mRNA expression in control and P-IMP2 ADSC treated with DMSO and NSC654259.