

Fig. S1. *Trdn-as* expression and virus fluorescence verification in myocardial tissue. (A) Expression of *Trdn-as* in mouse tissues.  $n = 5$ . (B, D) Fluorescence verification of myocardial tissue virus delivery. Scale bar: 20  $\mu\text{m}$ .  $n = 3$ . (C, E) Left ventricular end diastolic (LVEDD) and systolic (LVESD) dimensions by echocardiography.  $n = 7$ . \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$  vs db/m, # $P < 0.05$ , ## $P < 0.01$  vs db/db. Data were expressed by mean  $\pm$  SEM.

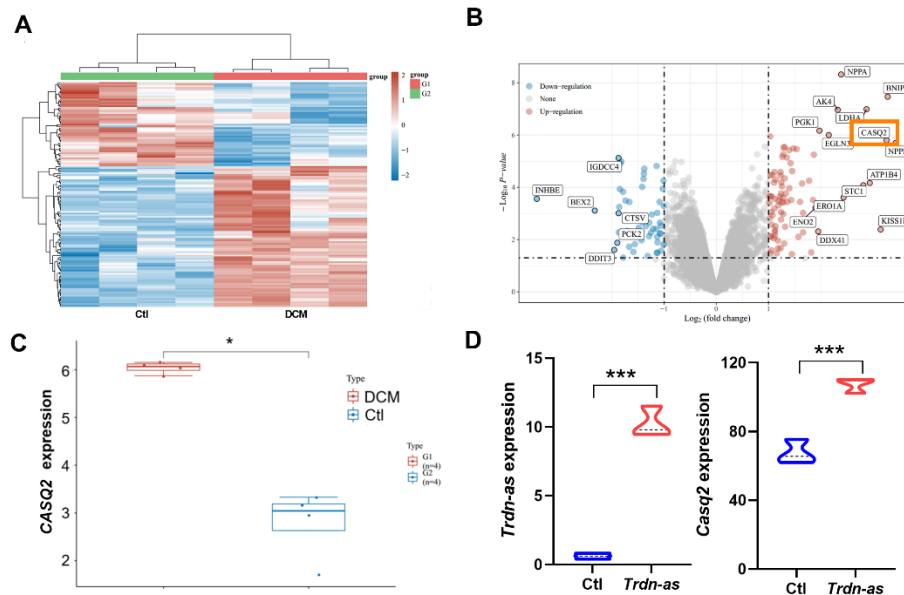


Fig. S2 *CASQ2* expression changes in the GEO database. (A) Alterations in gene expression in a DCM model utilizing induced pluripotent stem cells (iPSCs). (B) Volcanic map of gene change in GEO database. (C) Changes of *CASQ2* gene expression in DCM model. (D) Alterations in the expression levels of *Trdn-as* and *CASQ2* were observed in the transcript sequencing of *Trdn-as* overexpressed

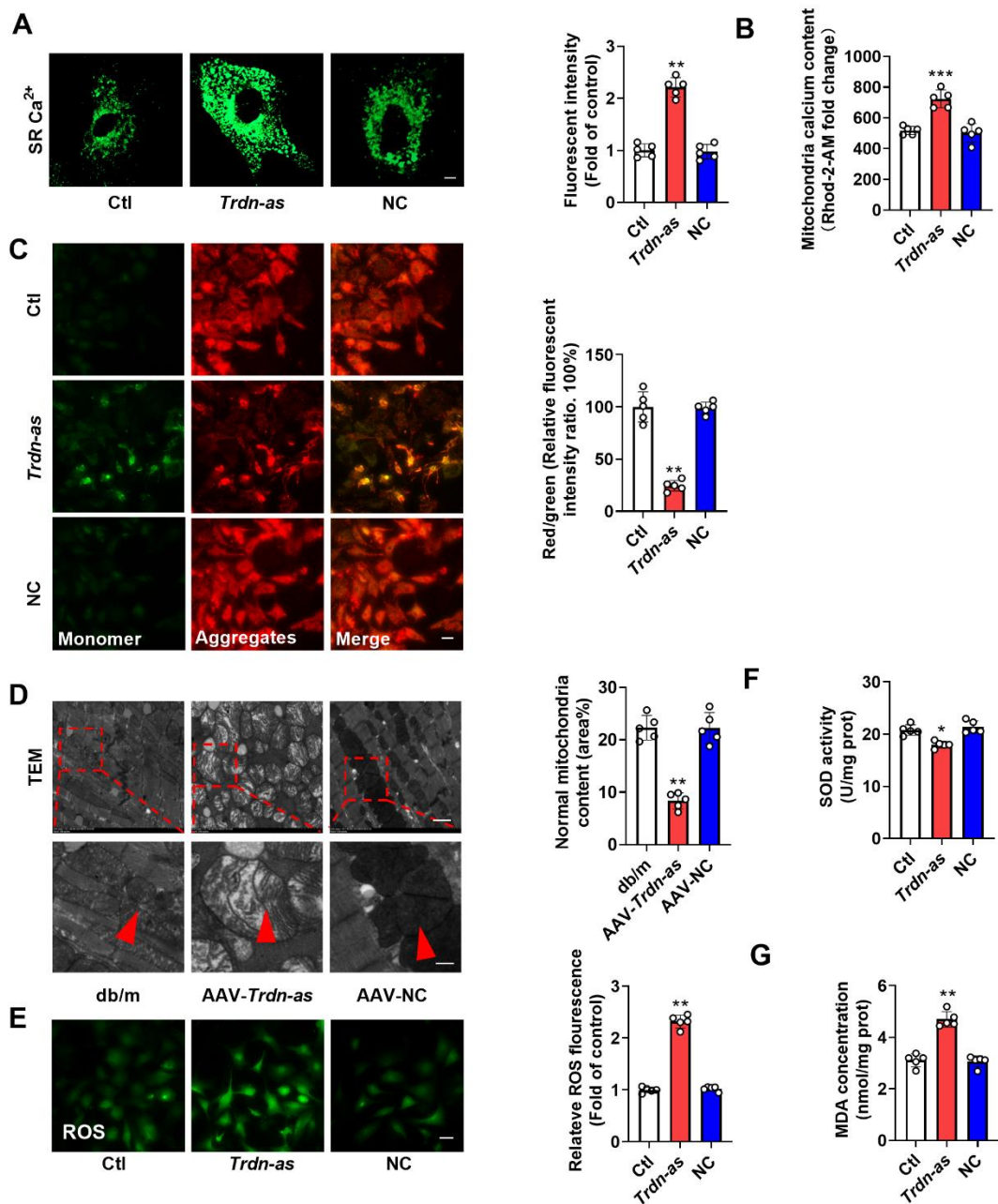


Fig. S3 *Trdn-as* induces Ca<sup>2+</sup> homeostasis imbalance in primary myocardial cells. (A) Overexpression of lncRNA-*Trdn-as* increases the content of sarcoplasmic reticulum Ca<sup>2+</sup> concentration in cells. Scale bar: 10  $\mu$ m.  $n = 5$ . (B) Under the condition of high glucose induction, the contents of mitochondria Ca<sup>2+</sup> level was increased.  $n = 5$ . (C) The fluorescence of JC-1 was detected and the fluorescence intensity, the ratio of JC-1 (red: 590 nm/ green: 530 nm) was calculated; Scale bar: 20  $\mu$ m.  $n = 5$ . \*\* $P < 0.01$  vs Ctl, \*\*\* $P < 0.001$  vs Ctl. (D) Mitochondria detected by electron microscopy in cardiac tissue. The red arrow indicates swollen mitochondria. Scale bar: 2 and 1  $\mu$ m.  $n = 5$ . \*\* $P < 0.01$  vs db/m. (E) Representative images of ROS staining.  $n = 5$ . Scale bar: 20  $\mu$ m. (F) Relative SOD activity in NMCMs.  $n = 5$ . (G) Relative MDA concentration in NMCMs.  $n = 5$ . \* $P < 0.05$ , \*\* $P < 0.01$  vs Ctl. Data were expressed by mean  $\pm$  SEM

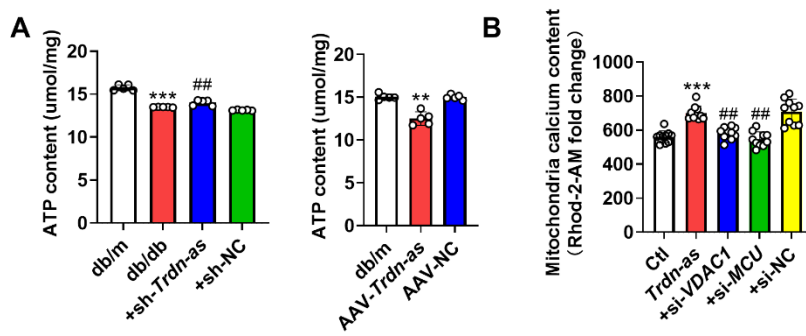


Fig. S4 ATP production in myocardial tissue and mitochondria calcium content. (A) ATP production in myocardial tissue. \*\* $P < 0.01$ , \*\*\* $P < 0.001$  vs db/m, ## $P < 0.01$  vs db/db.  $n = 5$ . (B) Relative mitochondria  $\text{Ca}^{2+}$  level in NMCMS. \*\*\* $P < 0.001$  vs. Ctl, ## $P < 0.01$  vs. *Trdn-as*.  $n = 10$ . Scale bar: 50  $\mu\text{m}$ . Data were expressed by mean  $\pm$  SEM.

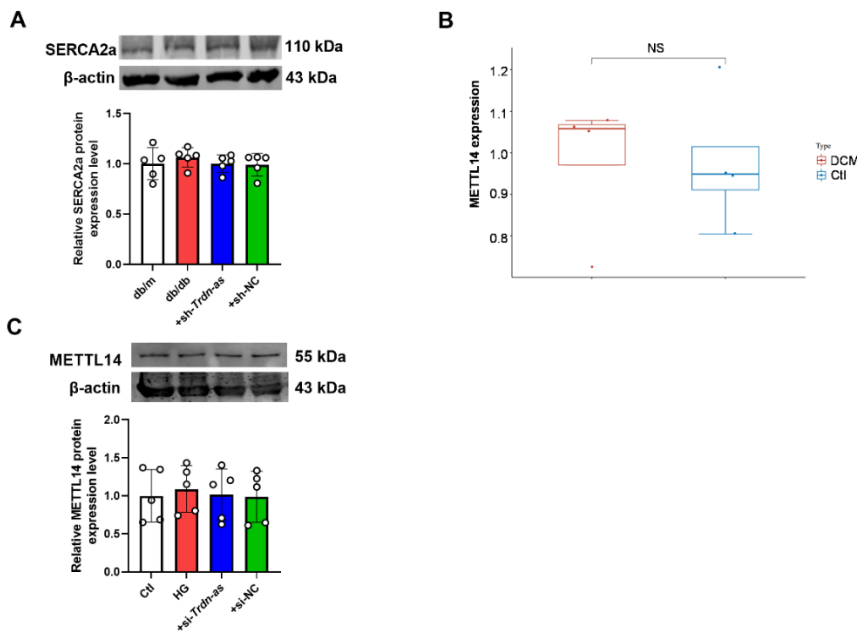


Fig. S5 METTL14 and SERCA2a protein expression changes. (A) SERCA2a protein expression.  $n = 5$ . (B) Expression changes of METTL14 in the GEO database. (C) METTL14 protein expression in HG and *Trdn-as* knockdown condition.  $n = 5$ .

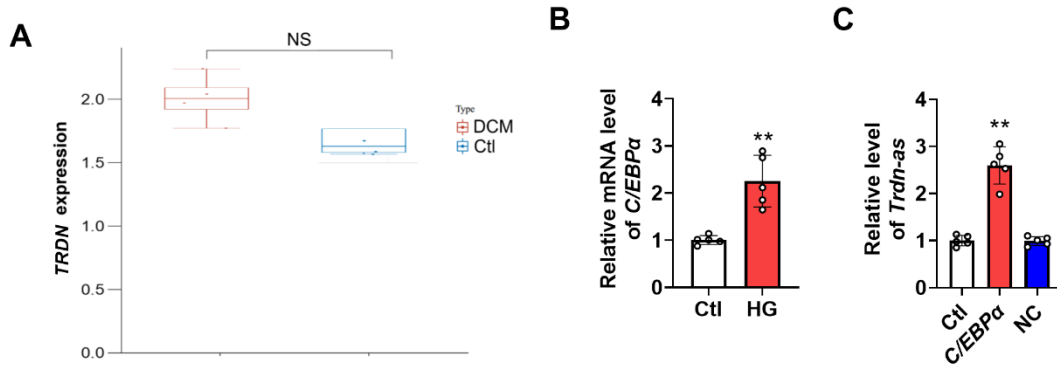


Fig. S6. *TRDN* expression changes in the GEO database and *Trdn-as* expression. (A) Expression changes of *TRDN* in the GEO database under the condition of DCM model. (B) *C/EBPα* mRNA expression in HG condition.  $n = 5$ ,  $**P < 0.01$  vs Ctl. (C) Overexpression of *C/EBPα* increases the expression of *Trdn-as*.  $n = 5$ .  $**P < 0.01$  vs Ctl. Data were expressed by mean  $\pm$  SEM.