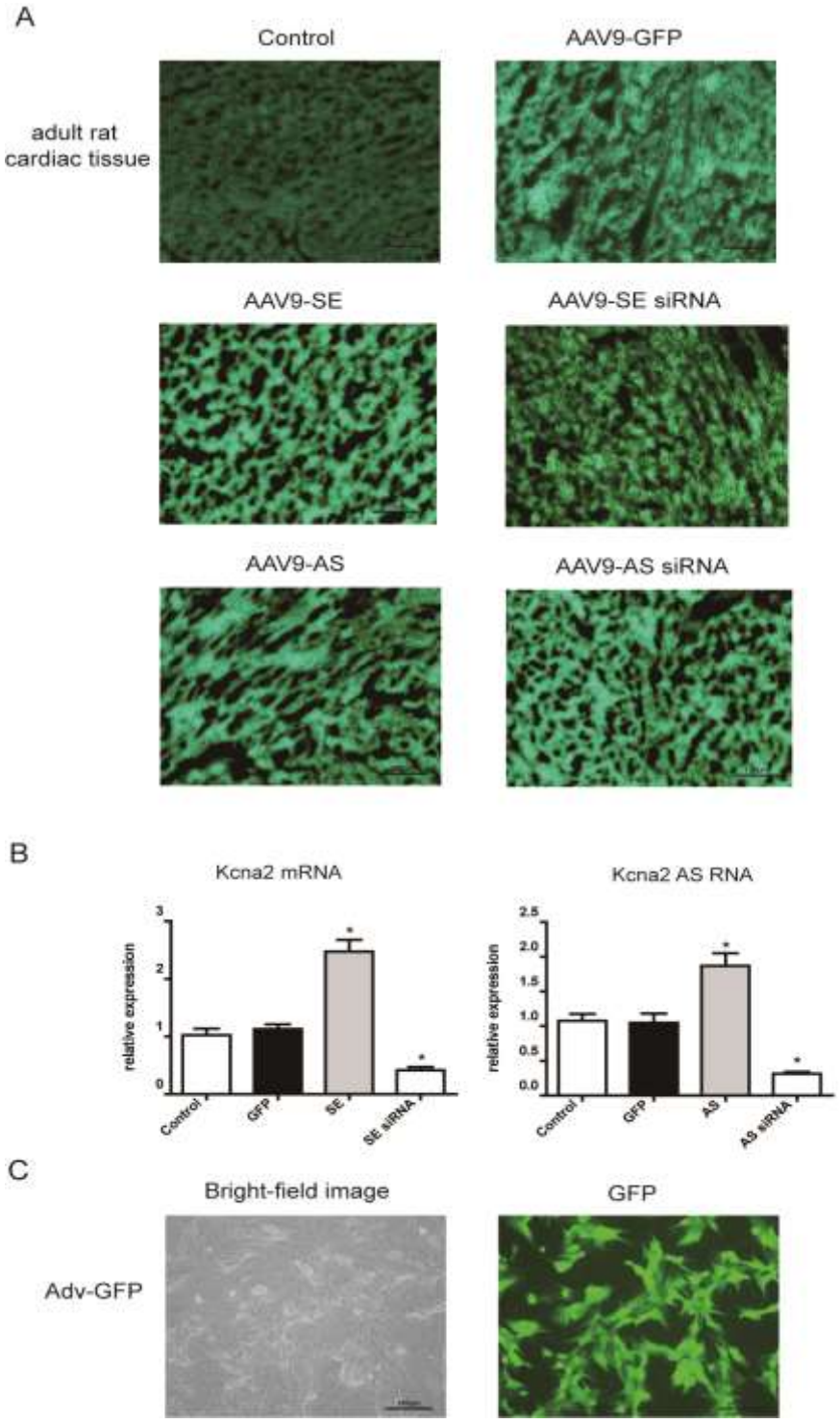
SUPPLEMENTAL MATERIAL

Table S1. Sequences of primers

Gene	Species	Sequences
RT-PCR		
GAPDH-RT	Rat	5'-GAGGGTGCAGCGAACTTTATTGAT-3'
Kcna2 AS-RT	Rat	5'-CGTCACACCTCCTGAGGACAG-3'
GAPDH-F	Rat	5'-ACCACAGTCCATGCCATCAC-3'
GAPDH-R	Rat	5'-TCCACCACCCTGTTGCTGTA-3'
Kcna2 AS-F	Rat	5'-CTGCCCCCAGACTGGTAGTA-3'
Kcna2 AS-R	Rat	5'-CCCAGTGGATGAGGCTGCTG-3'
qRT-PCR		
GAPDH-RT	Rat	5’-TCCTGTTGTTATGGGGTCTG-3’
Kcna2-RT	Rat	5’-GGGTGACTCTCATCTTTGGA-3’
Kcna2 AS-RT	Rat	5’-CTGGCAGCATCATAATAATAG-3’
GAPDH-F	Rat	5’-TCGGTGTGAACGGATTTGGC-3’
GAPDH-R	Rat	5’-CCTTCAGGTGAGCCCCAGC-3’
Kcna2-F	Rat	5’-CCCATCTGCAAGGGCAACGT-3’
Kcna2-R	Rat	5’-CACAGCCTCCTTTGGCTGGC-3’
Kcna2 AS-F	Rat	5’-CTGAGGACAGCCAGGAGGA-3’
Kcna2 AS-R	Rat	5’-GCTTGAGGGACAGTGAGATG-3’
ANP-F	Rat	5’-CTCCCAGGCCATATTGGAG-3’
ANP-R	Rat	5’-TCCAGGTGGTCTAGCAGGTT-3’
BNP-F	Rat	5’-TGGGAAGTCCTAGCCAGTCTC-3’
BNP-R	Rat	5’-TCTGAGCCATTTCCTCTGAC-3’
GAPDH-RT	Human	5’-TGGTAGTTCGATGTAGCTAG-3’
Kcna2-RT	Human	5’-CTTGAGGTCGGGTATCGTAT-3’
Kcna2 AS-RT	Human	5'- ACTCACCATTATTTCTAGCTCG -3'
GAPDH-F	Human	5’-GGAGCGAGATCCCTCCAAAAT-3’
GAPDH-R	Human	5’-GGCTGTTGTCATACTTCTCATGG-3’
Kcna2-F	Human	5’-AGACCACGAGTGCTGTGAGA-3’
Kcna2-R	Human	5’-AGTACCTCATTCGTTTCTTTGGG-3’
Kcna2 AS-F	Human	5’- TCTAAGGGCACATTCACAGGTC -3’
Kcna2 AS-R	Human	5’- TGTTGGTGCATCTCAGATTCCT -3’

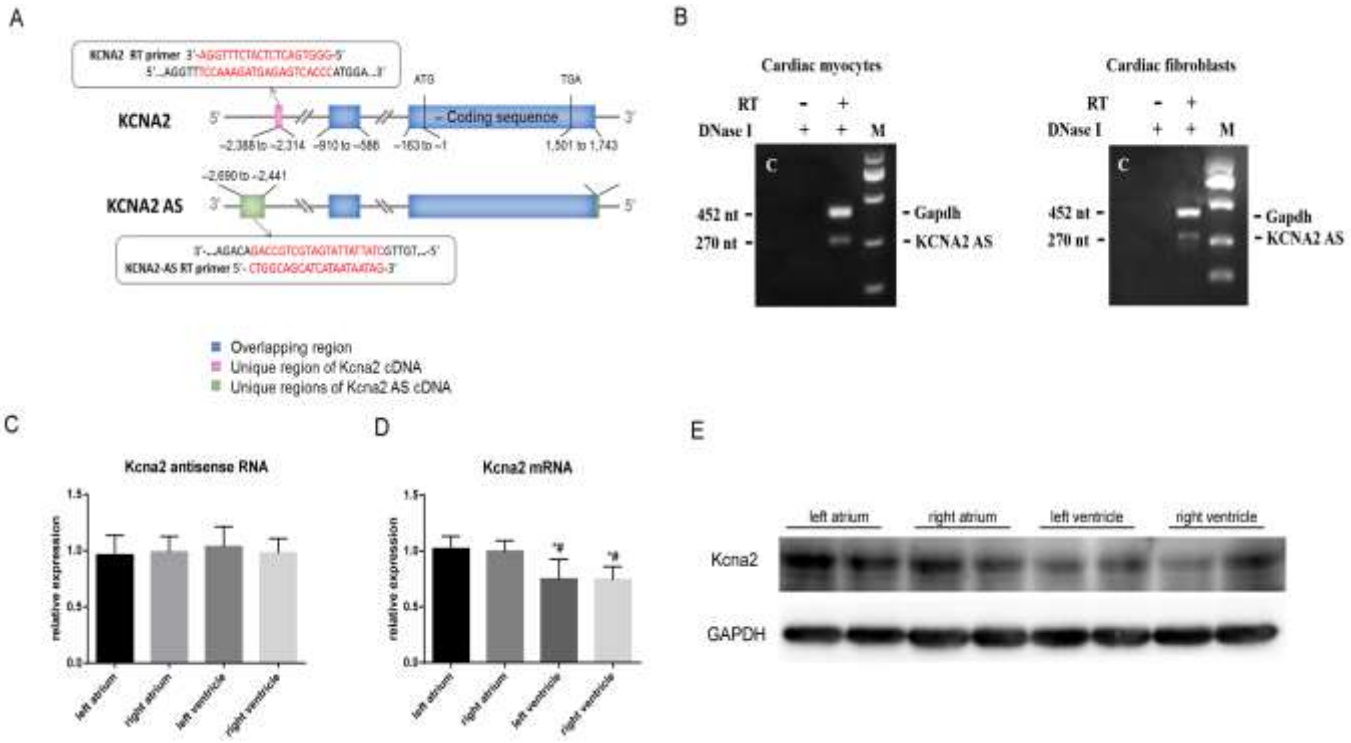
RT: reverse transcription, F: forward, R: reverse.

Figure S1. Transfection efficiency using fluorescence in vivo and in vitro.



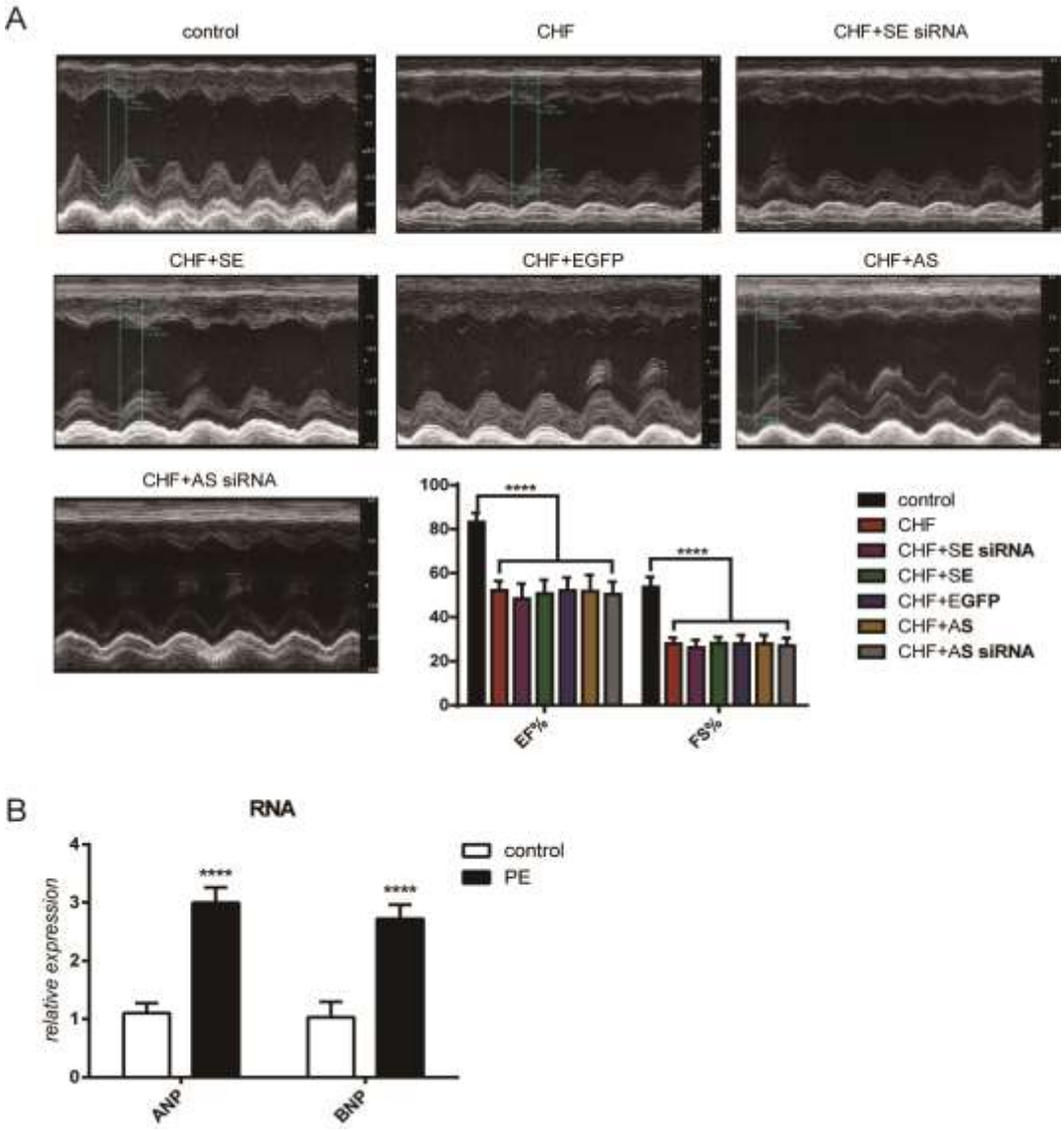
A: Control cardiac tissue and AAV9-GFP, AAV9-SE, AAV9-SE siRNA, AAV9-AS, AAV9-AS siRNA infected cardiac tissue (right; ×200 magnification). B: qRT-PCR results for Kcna2 mRNA and Kcna2 AS expression levels in heart samples from adult rats treated with various constructs (n=4). **P*<0.05 versus Control. C: Fluorescence images of primary cultured neonatal cardiomyocytes transfected with Adv-GFP. Bright-field image (left); fluorescent image (right; ×200 magnification).

Figure S2. Identification and expression of Kcna2 AS and Kcna2 mRNA in rat hearts.



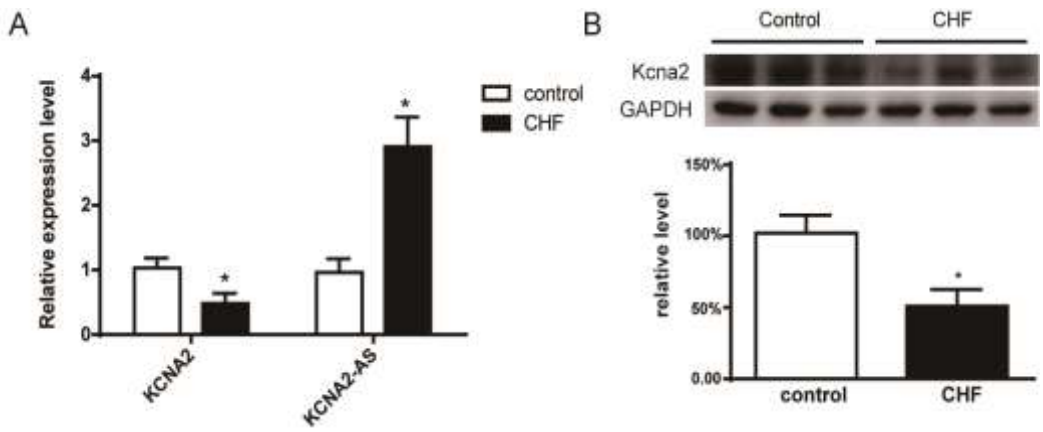
A: Specific RT primers targeting the unique sequences of Kcna2 or KCNA2 AS RNA were used to perform reverse transcription. We obtained transcript specific cDNA for downstream RT-PCR or qRT-PCR. B: Kcna2 AS transcripts were detected in cardiac myocytes and fibroblasts of rat using reverse transcription (RT)-PCR with strand-specific primers. Gapdh is a control. C, no-template control. n=3 repeated experiments per species. C: The qRT-PCR results show native Kcna2 AS expression in the left atrium, right atrium, left ventricle, and right ventricle. GAPDH was used as a Control. The data are from three separate experiments. (n=6) D: qRT-PCR and E: Western blot showing the Kcna2 levels. (n=6). * $P<0.05$, # $P<0.05$ versus the respective Controls.

Figure S3. The evaluation of cardiac dysfunction in the respective in vivo and in vitro models.



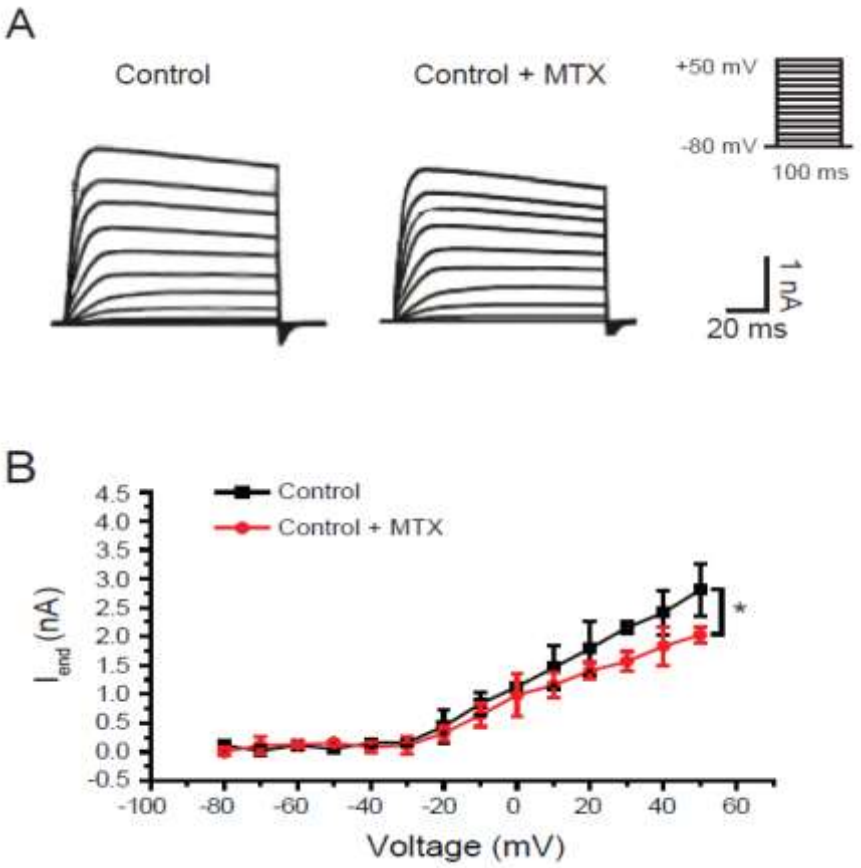
A, Fractional shortening (%) and ejection fraction (%) measured by echocardiography 8 weeks after the TAC procedure (n=6). control: sham surgery; CHF: rats with congestive heart failure; CHF+SE siRNA: knockdown of Kcna2 in rat hearts with CHF; CHF+SE: overexpression of Kcna2 in rat hearts with CHF; CHF+EGFP: green fluorescent protein (GFP) expressing control in rat hearts with CHF; CHF+AS: overexpression of Kcna2 AS in rat hearts with CHF; CHF+AS siRNA: knockdown of Kcna2 AS in rat hearts with CHF. ****P<0.0001. B, The mRNA levels of ANP, BNP, and MYH7 were assayed using real-time PCR in primary neonatal rat cardiomyocytes (n=6). ****P<0.0001.

Figure S4. Expression of Kcna2 AS and Kcna2 in human normal and heart failure tissue.



A: Kcna2 AS levels were increased and Kcna2 mRNA levels were reduced in the hearts of patients with CHF (n=3). **P*<0.05 versus Control. Control: normal human; CHF: patients with congestive heart failure. B: Kcna2 protein levels were decreased in the hearts of patients with CHF (n=3). **P*<0.05 versus Control.

Figure S5. Kv1.2 channel encoding the Iks current.



A, Representative traces of the Iks current in cardiomyocytes before or after treatment with 100 nM MTX. MTX: maurotoxin, a selective Kcna2 current inhibitor. B, I-V curve for cardiomyocytes (n=9 cells, 3 rats) before or after treatment with 100 nM MTX. The current density was plotted against each voltage. *P<0.05 versus the control group.