

Supplementary Figures

Supplementary Figure S1. (A) Representative traces of dormant and firing WT SANC under adrenergic stimulation (ISO 100 nM) and subsequent perfusion of Nifedipine (3 μ M). (B) Distribution of resting membrane potential of dormant WT SANC. (C) Mean coefficient of variation of WT firing SANC (n=10) under ISO and ISO + Nife perfusion. (D) Comparison of resting membrane potentials between the WT dormant SANC that initiated firing under adrenergic stimulation (responders, n=8) and those that did not initiate firing (non-responders, n=11). * $p < 0.05$ by one-way ANOVA (C) or t-test (D).

Supplementary Figure S2. Comparison of AP parameters under adrenergic stimulation (ISO 100 nM) between dormant (n=12) and firing (n=21) $Ca_v1.2^{DHP-/-}$ SANC (A-G). Data are represented as mean $\pm$ SEM. (H) Comparison of membrane voltage between the $Ca_v1.2^{DHP-/-}$ dormant SANC that initiate firing under adrenergic stimulation (responders) and the ones that did not (non-responders). (I) Comparison of resting membrane potential (V_m) under Tyrode, MDP under ISO 100 nM and V_m under ISO + Nife 3 μ M in dormant $Ca_v1.2^{DHP-/-}$ SANC that stopped firing upon $Ca_v1.3$ inhibition. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, **** $p < 0.0001$ by unpaired t-test (A-H) or one-way ANOVA (I).

Supplementary Figure S3. (A) Line-scan and corresponding time-course of the integral of Ca^{2+} fluorescence in dormant $Ca_v1.2^{DHP-/-}$ SANC that did not respond to β -adrenergic stimulation (n=3) along with the average number (B), size (C), duration (D) and amplitude (E) of LCRs.

Supplementary Figure S4. (A) Time course of integral of Ca^{2+} fluorescence in an example of dormant $Ca_v1.2^{DHP-/-}$ SANC that stopped firing under $Ca_v1.3$ inhibition. Line-scan and time-course of Ca^{2+} fluorescence of specific time points (a, b and c squares) are represented below. Average distance between LCRs and following Ca^{2+} transient (B) and proportion of LCRs located < 20 ms before Ca^{2+} transient in the two $Ca_v1.2^{DHP-/-}$ SANC in which early effects of $Ca_v1.3$ inhibition could be observed.

Supplementary Figure S5. pThr17-PLB/total PLB in isolated SANC from $Ca_v1.2^{DHP-/-}$ mice incubated with Tyrode (n=41), ISO 100 nM (n=31) or ISO + Nife 3 μ M (n=29). Results are from N=3 mice. * $p < 0.05$ and **** $p < 0.0001$ by one-way ANOVA

Supplementary Figure S6. Representative traces of I_f (A) and $I_{Ca_v1.3}$ (B) currents in dormant (top, blue) and firing (bottom, red) SANC. Voltage steps ranged from -35mV to -135mV for I_f (A) and from -55mV to +60mV for $I_{Ca_v1.3}$ (B).

Supplementary Figure S7. (A). Anti $Ca_v1.3$ immunostaining of a mouse SAN-RA preparation. (B). Close-up view of anti- $Ca_v1.3$ immunofluorescence in a region within the white square in (A). Arrows indicate clusters of $Ca_v1.3$ expressing SANC in the SAN region. (C). Sample anti HCN4 immunostaining of the mouse SAN-RA preparation. The image comprises the whole cranial and caudal SAN from the superior (SVC) to inferior (IVC) *venae cavae*. Arrow indicate bundles of HCN4 expressing SAN extending to the central SAN. (D). Close-up view of anti-HCN4 immunofluorescence in a region within the white square in (C). Images are representative of N=3 SAN-RA preparations stained with anti- $Ca_v1.3$ and N=4 preparations stained with anti-HCN4 antibody. Other abbreviations: CT, *Crista terminalis*; IAS, interatrial septum; PNE, posterior nodal extension.