Online Figure 1
Zhang et al.

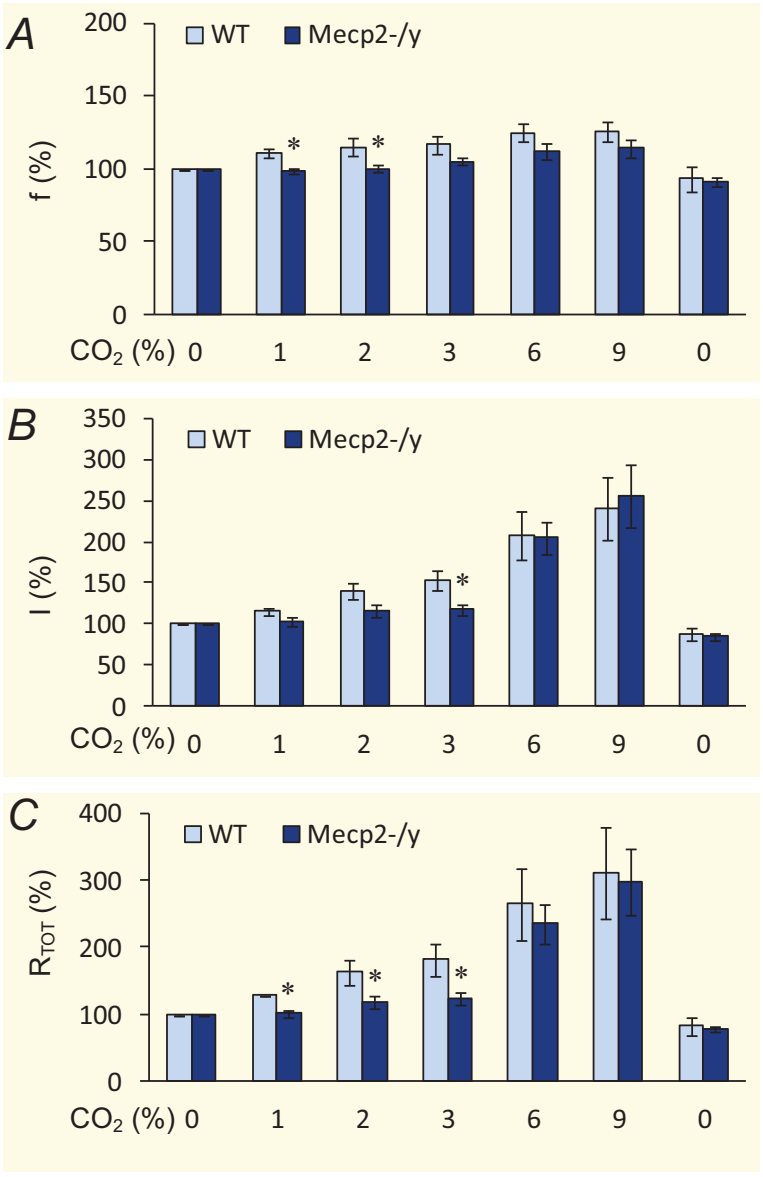

Fig. S1. The f, I and R_{TOT} were analyzed with various levels of CO_2 breathing in WT and mutant Prp57 mice with GFP expression in LC neurons. The *Mecp2*$^{-/Y}$ mice failed to respond to low dose (≤ 3%) CO_2 in all three measures (*, $P<0.05$, n= 4 pairs of mice), although all of these respiratory parameters appeared normal with 6 and 9% CO_2 in *Mecp2*$^{-/Y}$ mice.

Online Figure 2
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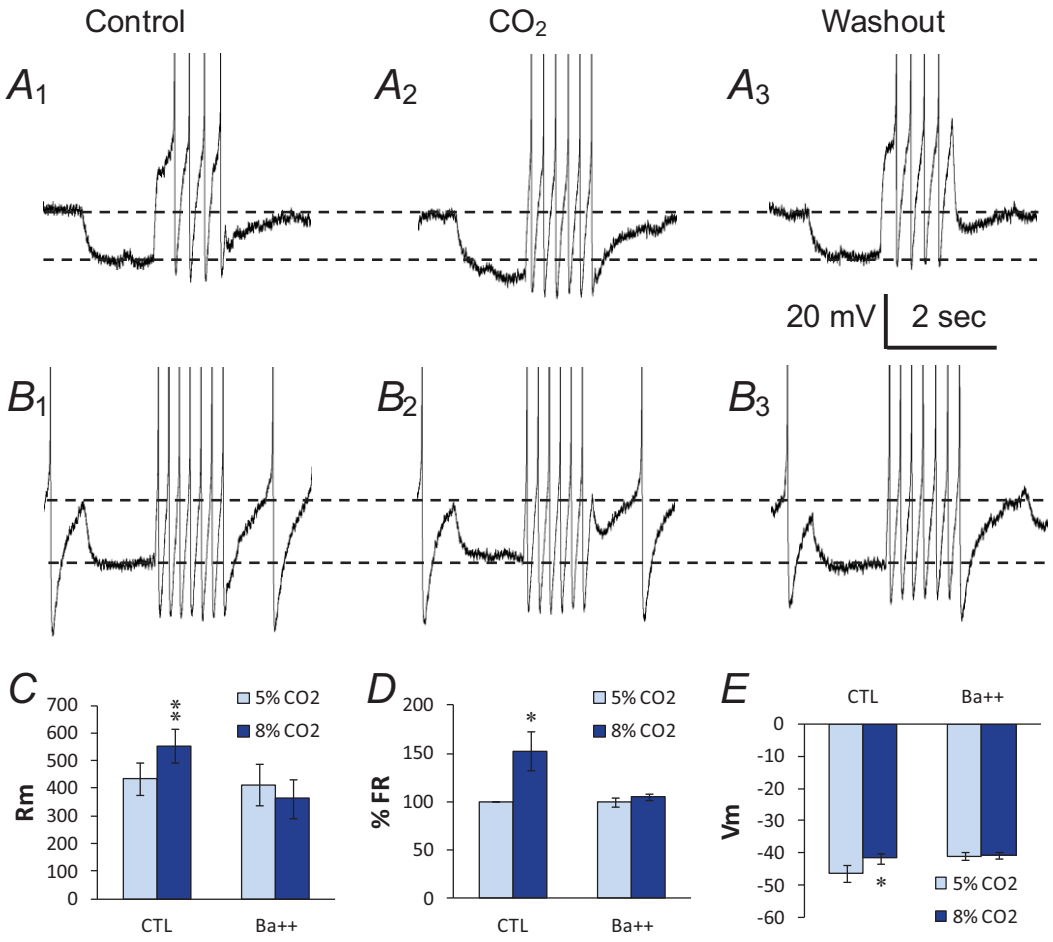

Fig. S2. Effects of Ba^{2+} on neuronal response to 8% CO_2 in WT neurons. ***A,B.*** Responses of Rm to CO_2 (8%) without (***A***) and with Ba^{2+} (***B***). The Rm was measured with injection of -0.02nA current pulses. The distance between two dash-lines indicates Rm with 5% CO_2 (***A1***, control) that was raised with the application of 8% CO_2 (***A2***). Such a CO_2 response was abolished in the presence of 200μM Ba^{2+} (***B***), which was summarized in ***C*** and expressed in percentage change. The hypercapnia-induced increase in firing frequency (***D***) and depolarization (***E***) were also suppressed when cells were exposed to Ba^{2+}. *, P<0.05; **, P<0.01 by paired *t*-test.

Online Figure 3
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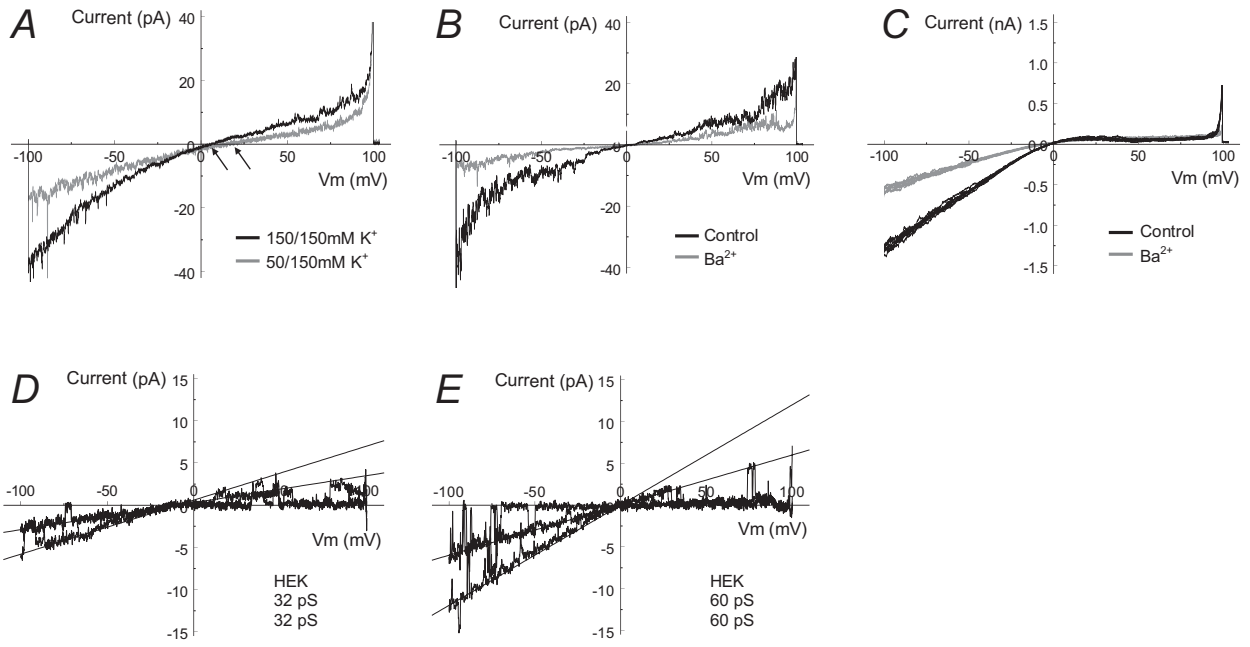

Fig. S3. ***A.*** Ionic currents were recorded in the inside-out patch from a WT neuron. The currents had inward rectification and showed a reversal potential at ~0 mV with symmetric K^+ concentration (150mM/150mM K^+) on both sides of patch membranes. When K^+ was replaced with 100mM Na^+ on the intracellular side (50mM/150mM K^+), the reversal potential right-shifted by 20mV (indicated with arrows), indicating that the channels are K^+ selective. ***B,C.*** Ba^{2+} sensitivity of Kir currents in LC neurons (***B***) and HEK cells expressing Kir4.1/Kir5.1 channels (***C***). Application of 200μM Ba^{2+} to intracellular membranes of inside-out patches inhibited neuronal Kir currents to the same degree as Ba^{2+} inhibition to Kir4.1/Kir5.1 currents expressed in HEK cells. ***D,E.*** Single channel conductance of homomeric Kir4.1 channels (***D***) and heteromeric Kir4.1/Kir5.1 channels (***E***) was measured in inside-out patches from HEK cells with a ramp voltage from −100 to 100 mV. The straight lines indicate slope conductance of 32pS (***D***) and 60pS (***E***), respectively.

Online Figure 4
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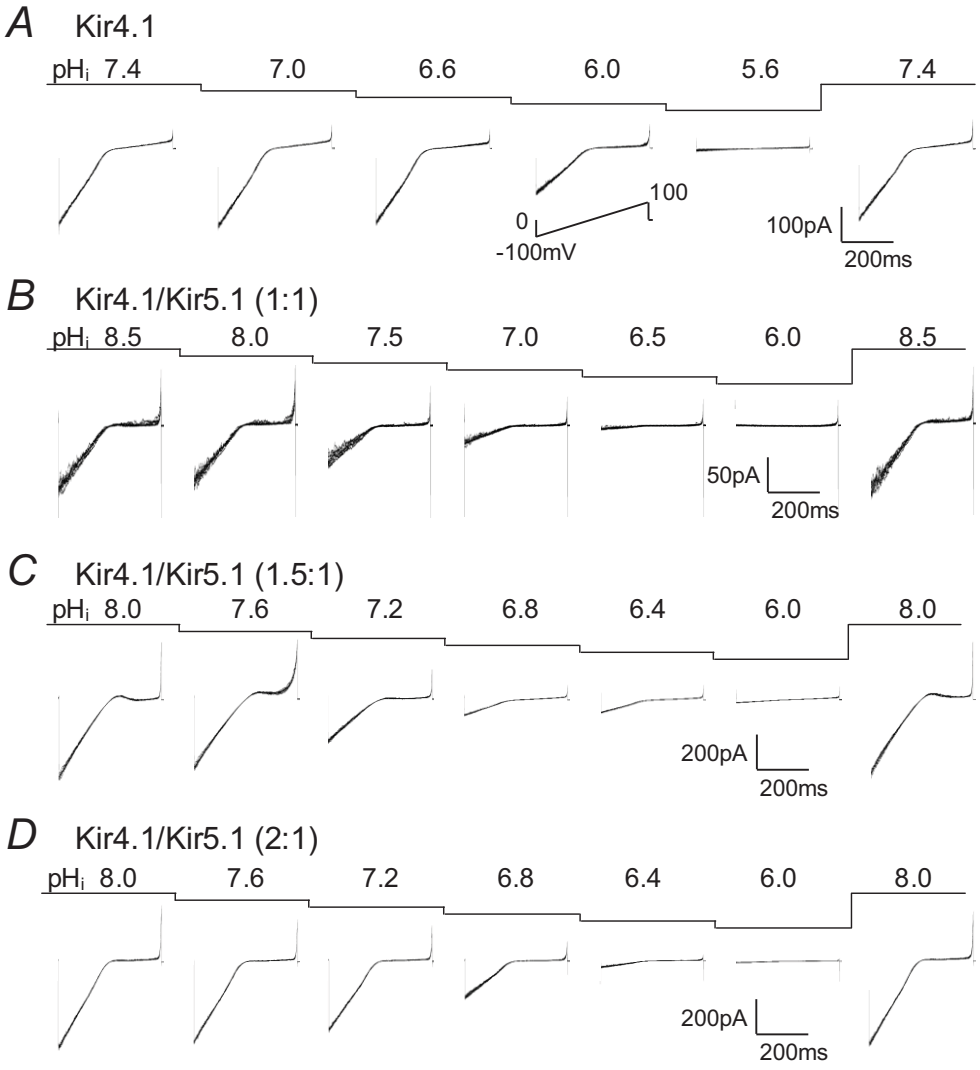

Fig. S4. Acidic pH_i induced dose-dependent inhibitions of Kir4.1 or/and Kir5.1 channels in HEK cells. In-side out patches were obtained from HEK cells expressing the Kir4.1 channel alone (***A***), Kir4.1 and Kir5.1 in a ratio of 1:1 (***B***), 1.5:1 (***C***) and 2:1 (***D***), respectively. With different Kir4.1/Kir5.1 ratios, the currents showed clearly different pH sensitivity. Note that 8 superimposed traces are shown in each panel.