Supplementary Figure Legends

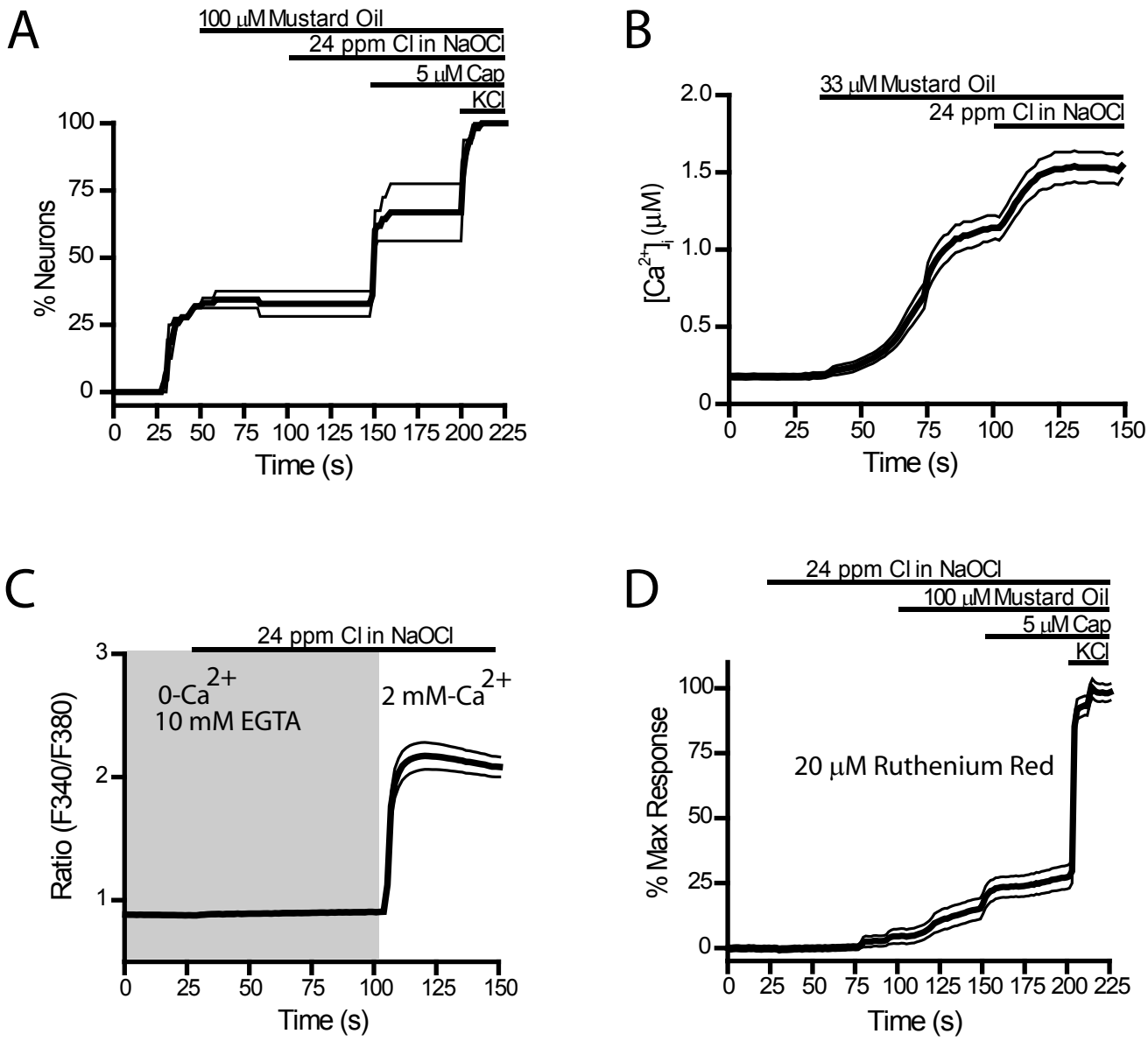
Supplementary Figure 1. Relation between NaOCl- and mustard oil-induced activation of sensory neurons.
(**A**) Activation of cultured murine DRG neurons by a saturating dose of mustard oil (100μM), followed by NaOCl (24 ppm total chlorine), capsaicin (5μM) and potassium chloride (KCl, 65mM). A neuron was considered to be activated when $[Ca^{2+}]_i$ exceeded 500nM. The thick line represents the averaged percentage of KCl-sensitive cells activated, plotted against time. Thin lines represent SEM (n=62 neurons). NaOCl application following activation by mustard oil did not activate any additional cells.
(**B**) Response of cultured sensory neurons to an initial non-saturating dose of mustard oil (33 μM), followed by a saturating dose of NaOCl (24 ppm). Averaged $[Ca^{2+}]_i$ in mustard oil-sensitive cells are plotted against time as percentage of maximal $[Ca^{2+}]_i$ levels in the recording (thick line). Thin lines represent SEM (n= 72 neurons). Challenge with NaOCl led to further activation of Ca^{2+}-influx into mustard oil-sensitive cells.
(**C**) Dependence of NaOCl-induced neuronal activation on extracellular Ca^{2+}. Averaged Fura-2 emission ratios of cultured murine DRG neurons are shown (thick line). Cells were first superfused with Ca^{2+}-free, 10 mM EGTA-buffered extracellular solution containing a saturating concentration of NaOCl (24ppm, blue background). This was followed by extracellular solution containing 2 mM Ca^{2+} and agonist (red background). No increase in $[Ca^{2+}]_i$ could be observed in Ca^{2+} -free medium, even after 100 seconds of agonist application. When the extracellular medium was replenished with Ca^{2+} a robust increase in $[Ca^{2+}]_i$ occurred in the presence of NaOCl. Thin lines represent SEM (n=41 neurons).
(**D**). Inhibition of NaOCl-induced neuronal activation by the TRP channel blocker ruthenium red. Cultured DRG neurons were superfused with NaOCl (24 ppm), complemented by mustard oil (100μM), capsaicin (5 μM), and KCl (65mM), in the presence of 20μM ruthenium red. Ruthenium red almost completely blocked neuronal activation by NaOCl, and partially blocked responses to mustard oil and capsaicin. Ruthenium red block of TRP channels is voltage dependent. Therefore, complete pore block cannot be achieved, leading to slow influx of Ca^{2+}. KCl activated robust Ca^{2+}-influx through voltage-gated Ca^{2+}-channels. The thick line represents the averaged percentage of maximal $[Ca^{2+}]_i$ response of KCl-sensitive cells, plotted against time at 10x magnification. Thin lines represent SEM (n= 49 neurons).

Supplementary Figure 2. Retention of the respiratory irritant response to acetic acid aerosol in TRPA1-/- mice.
(**A**) Effects of acetic acid and NaOCl aerosols on respiratory frequencies (plotted as averaged % of baseline) of wild-type and TRPA1-/- mice. Bars indicate changes in respiratory frequencies from baseline (100%) in response to the given irritant (acetic acid=white, NaOCl=black). Both wild-type (WT) and TRPA1-/- (KO) mice display a reduction in respiratory frequencies during exposure to acetic acid aerosol (n=4 each) and wild-type (WT) mice display a similar reduction in respiratory frequency in response to NaOCl (n=11). In contrast, TRPA1-/- mice respiratory frequencies were largely unaffected by NaOCl (n=11). *, significantly different from the other treatment groups, α=0.05, determined by Bonferroni post-hoc analysis following two-way ANOVA.
(**B**) Effects of acetic acid and NaOCl aerosols on end expiratory pause (EEP) in wild-type and TRPA1-/- mice. Bar graph indicates increases of EEP in response to the given irritant (acetic acid=white, NaOCl=black) with average baseline EEP subtracted. Both wild-type (WT) and

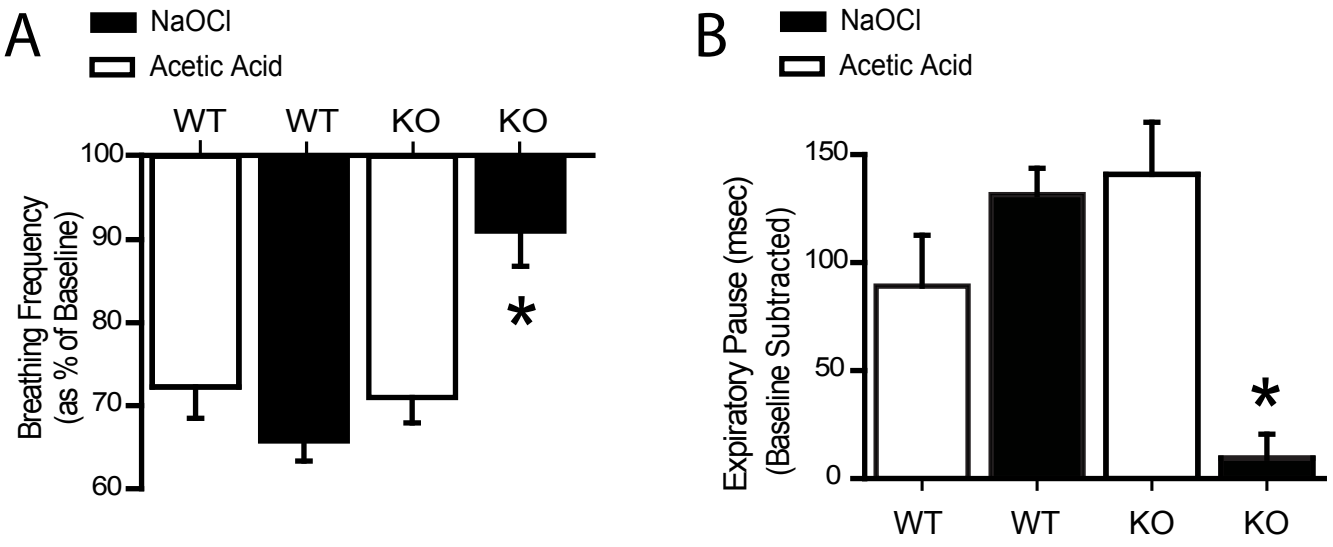
TRPA1-/- (KO) mice respond with an increase in EEP to acetic acid aerosol and wild-type (WT) mice display a similar increase in EEP in response to NaOCl (n=11). In contrast, TRPA1-/- mice EEP were not changed by NaOCl ((n=11). *, significantly different from the other treatment groups, α=0.05, determined by Bonferroni post-hoc analysis following two-way ANOVA.

Supplementary Figure 3. Block of neuronal H_2O_2 responses by ruthenium red; control cell attached single channel recording.
(**A**) Inhibition of H_2O_2-induced neuronal activation by the TRP channel blocker ruthenium red. Cultured DRG neurons were superfused with H_2O_2 (5 mM), followed by capsaicin (3 μM), and KCl (65mM), in the presence of 20μM ruthenium red. Ruthenium red almost completely blocked neuronal activation by H_2O_2, and partially blocked responses to capsaicin. The thick line represents the averaged $[Ca^{2+}]_i$, plotted against time at 10x magnification. Thin lines represent SEM (n= 64 neurons).
(**B**) Baseline single channel hTRPA1 currents prior to application of H_2O_2 in the cell attached configuration, recorded from the same patch displayed in Figure 5B.

Supplementary Figure 1



Supplementary Figure 2



Supplementary Figure 3