

**Suppl. Fig. 1: Kcns1 is enriched in myelinated sensory neurons**

A) Kcns1 protein is expressed in a subpopulation of myelinated neurons (indicated by β3tubulin staining) that have medium-large size somata and express NF200 (arrows). Bottom, cell size distribution of Kcns1-expressing neurons in lumbar DRG (n=3 mice).

B) The vast majority of Kcns1-IR neurons (arrows) do not express peripherin, CGRP or IB4 which indicate small, peptidergic, and non-peptidergic nociceptors, respectively. However, a minority of medium-large neurons positive for CGRP were found to express Kcns1 (asterisks) and most likely correspond to Aδ and Aβ nociceptors. Observations from n=3 mice.

Scale bars = 40μm.



**Suppl. Fig. 2: Kcns1 antibody immunoreactivity in the sciatic nerve of control and KO mice**

Kcns1 immunoreactivity does not appear to be neuronal, evident by the lack of co-localisation with β3tubulin (left panels), as well as the fact that it is retained following KO in sensory neurons (right panels). Observations from n=4 mice/group. Scale bar, 40μm.



**Suppl. Fig. 3: Control staining of mouse nerve with secondary antibody**

Non-specific background fluorescence when primary antibody was omitted from the immunohistochemistry reaction. Scale bar, 40μm.



**Suppl. Fig. 4: Kcns1 deletion is restricted to peripheral sensory neurons**

Induction of kcns1 deletion by tamoxifen does not influence expression in the CNS, as evident by the unaltered and robust Kcns1 expression in large motoneurons of the spinal cord in cKO mice. Right, quantification of percentage of motoneurons expressing Kcns1 protein (p>0.05, n=7/group, Student’s t-test). Scale bar, 50μm.



**Suppl. Fig. 5: Western blot analysis using KCNS1 antibody**

A) The KCNS1 antibody can detect a band at the expected molecular weight (~80kDa, arrow) in HEK cells transfected with a KCNS1-EGFP-expressing plasmid (lane 2), but not in untransfected HEK cells (lane 1). Additionally, a reduced amount of the protein is detected in transfected HEK cells which have also been treated with KCNS1 shRNA (lane 3).

B) A band corresponding to native KCNS1 (~55kDa, arrow) is detected in whole DRG lysates from WT mice, however a band of the same density remains in samples from KO mice. This result illustrates that the antibody does not differentiate between linearized forms of KCNS1 and other closely-related endogenous proteins.

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**Suppl. Fig. 6**: **Effect of tamoxifen treatment on mechanical pain of male and female mice (pooled data)**.

Tamoxifen induces a reduction in von Frey thresholds of KO mice, which is significantly different to that of floxed littermates (p<0.05; n=23/group, two-way RM ANOVA with Tukey’s).