



**Supplemental Figure 1. Effects of denervation at caudal retraction area.**

**(A)** Optogenetic muscle paradigm. Left: Schematic of transdermal muscle illumination in Emx1-ChR2 mice. Position of optogenetic illumination indicated with blue spot. Right: Experimental timeline.

**(B)** Whisker retractions evoked by optogenetic nerve stimulation from an example mouse at various times relative to nerve transection. Each trace is the average of 10 responses to a different duration of illumination at 8 mW. red, 5 ms stimulus; black, 1000 ms stimulus; gray, 1, 3, 10, 20, 50, 100 ms. Insets (below) show movements on an expanded time scale.

**(C)** Time course of peak amplitude (left), time course of peak velocity (middle), and time course of persistence index from 1000 ms stimuli. High persistence index indicates low fatigability. Red, 5 ms; black, 1000 ms stimuli. Values are mean  $\pm$  SEM; n=9 mice.

**(D)** Comparison of baseline and 7 d response duration families for peak amplitude (left) and peak velocity (middle). Red, 5 ms; black, 1000 ms stimuli. Values are mean  $\pm$  SEM; n=9 mice.