

## Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: **Optogenetically-evoked L6-CT activity in the S1HL cortex elicits spontaneous nocifensive behavior. Related to Fig. 1e, f, 6d.** Optogenetic stimulation of L6-CT neurons in S1HL of a L6-ChR2 mouse with fiber optic implant elicits lifting and shaking of left hindpaw.

File Name: Supplementary Movie 2

Description: **Optogenetically-evoked L5 activity in the S1HL cortex does not elicit nocifensive behavior. Related to Fig. 6d.** Optogenetic stimulation of L5 neurons in S1HL of a L5-ChR2 mouse with fiber optic implant does not elicit obvious behavioral reactions.