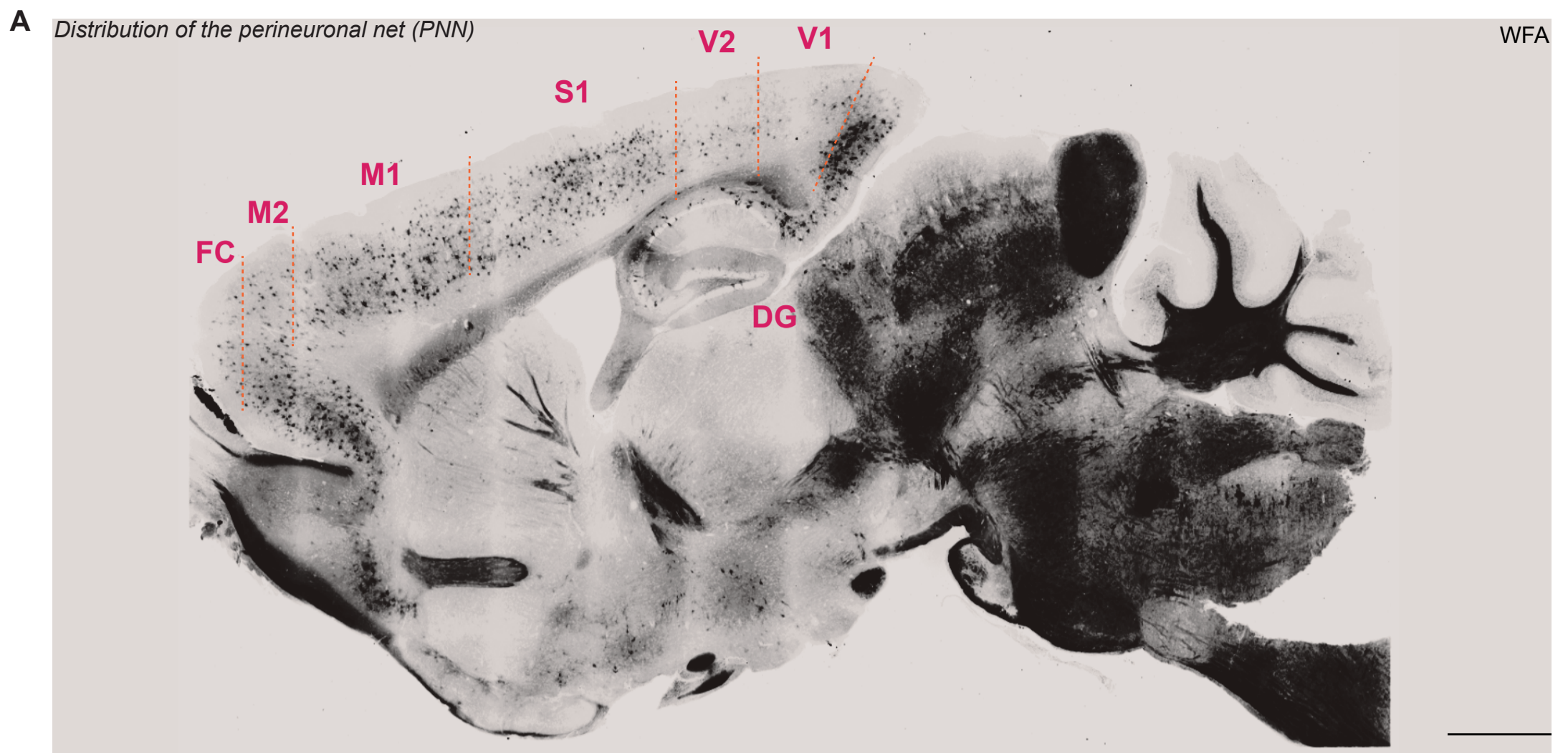
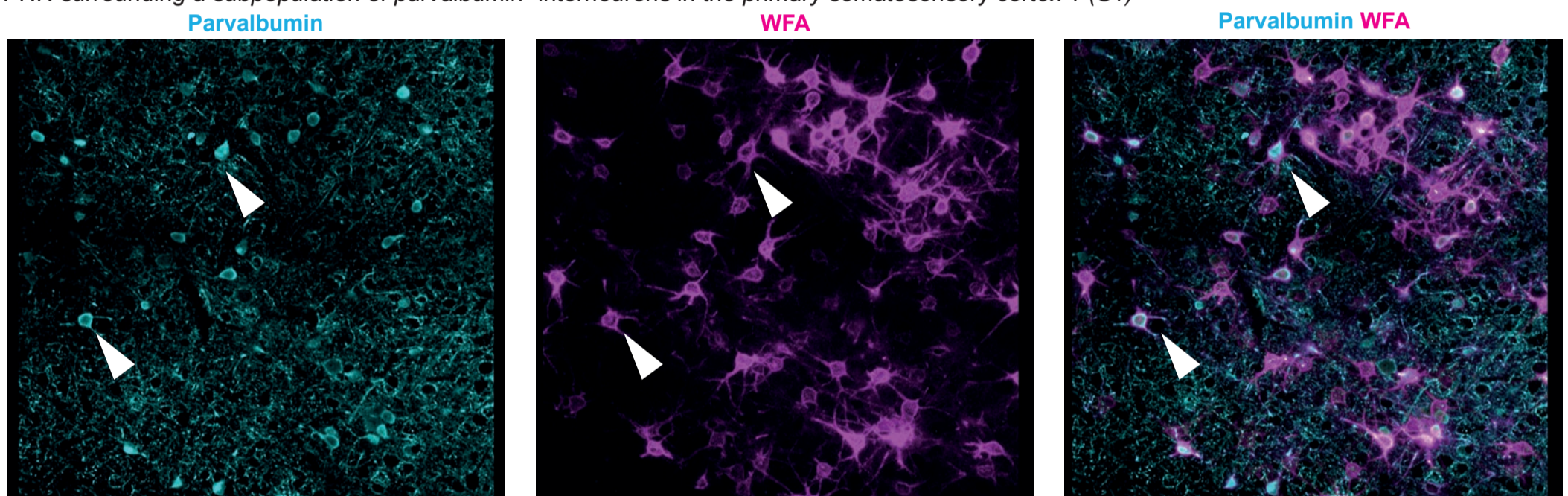


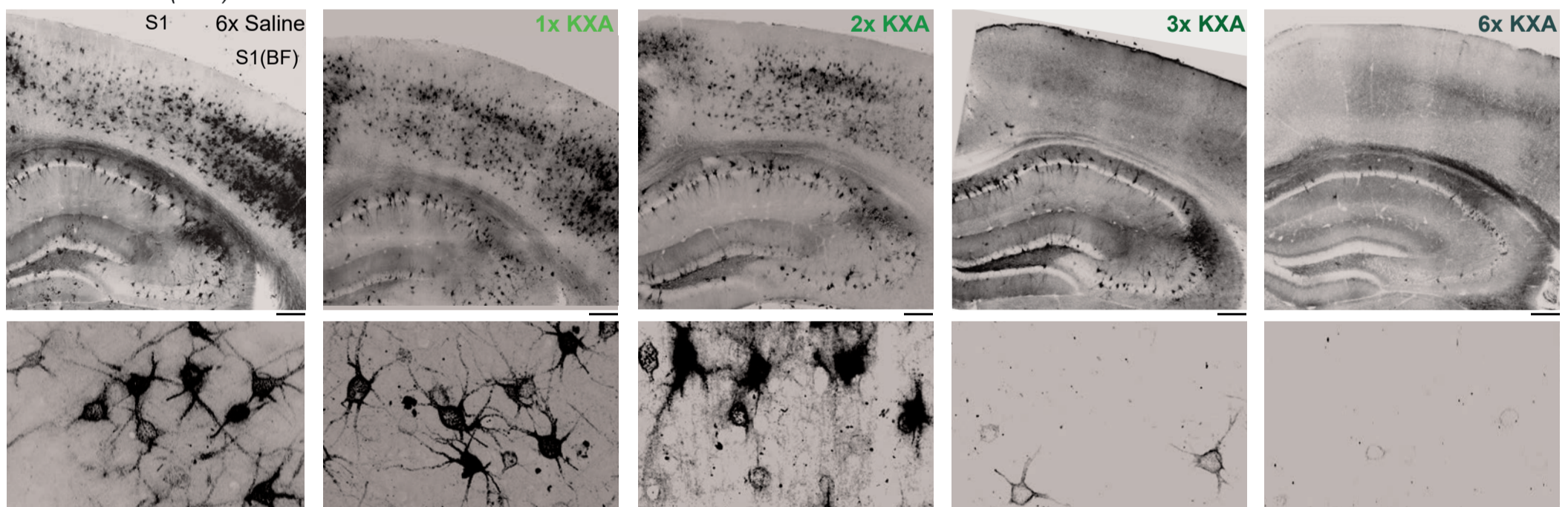
Figure S1. PNN distribution in the cortex, Related to Figure 1



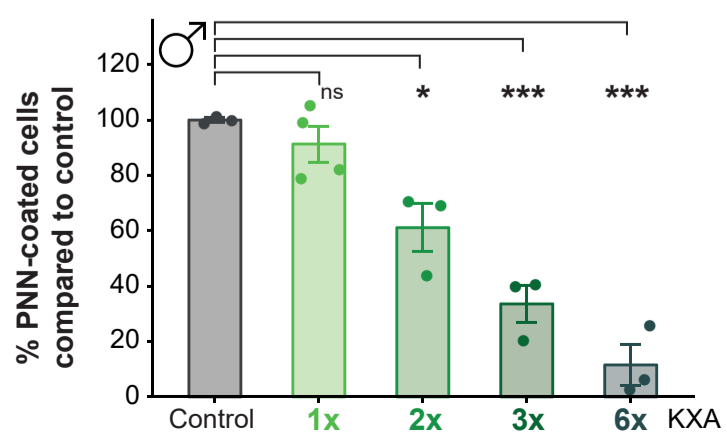
**B** PNN surrounding a subpopulation of parvalbumin<sup>+</sup> interneurons in the primary somatosensory cortex 1 (S1)



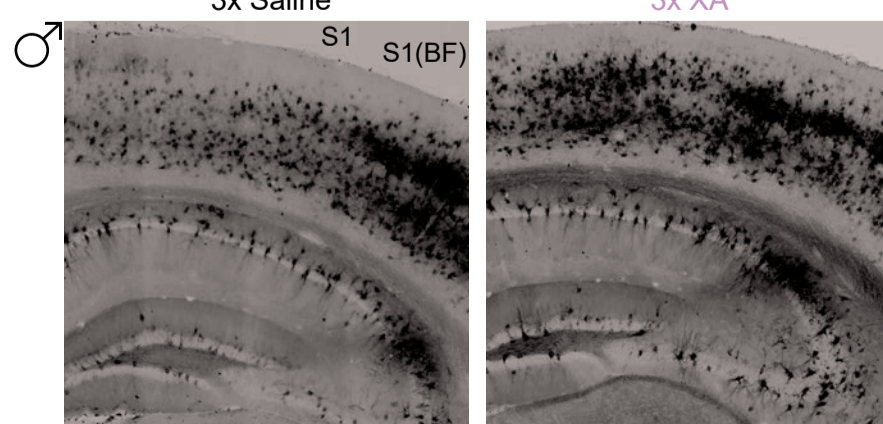
**C** Perineuronal net (PNN) distribution in S1 of males



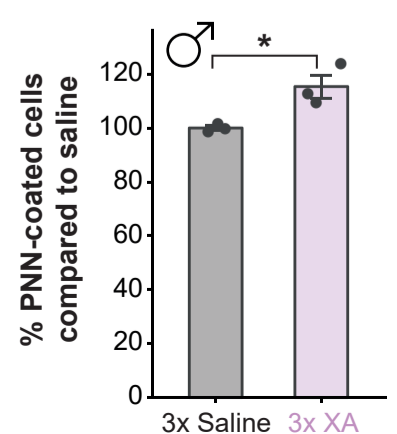
**D** Density of PNN-coated cells



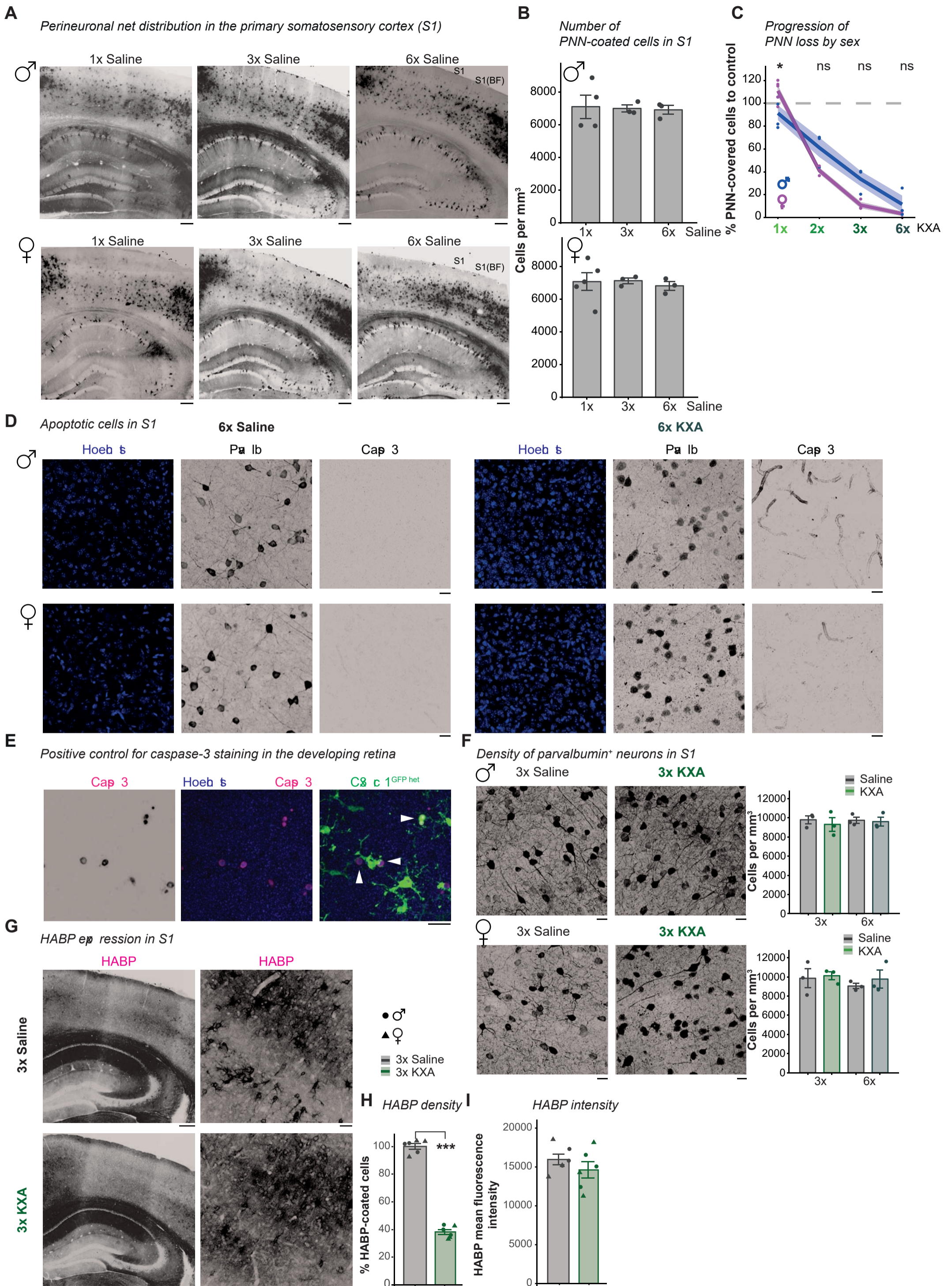
**E** PNN distribution under *ly* a $\tilde{z}$  ne-aceproma $\tilde{z}$  ne (XA) alone



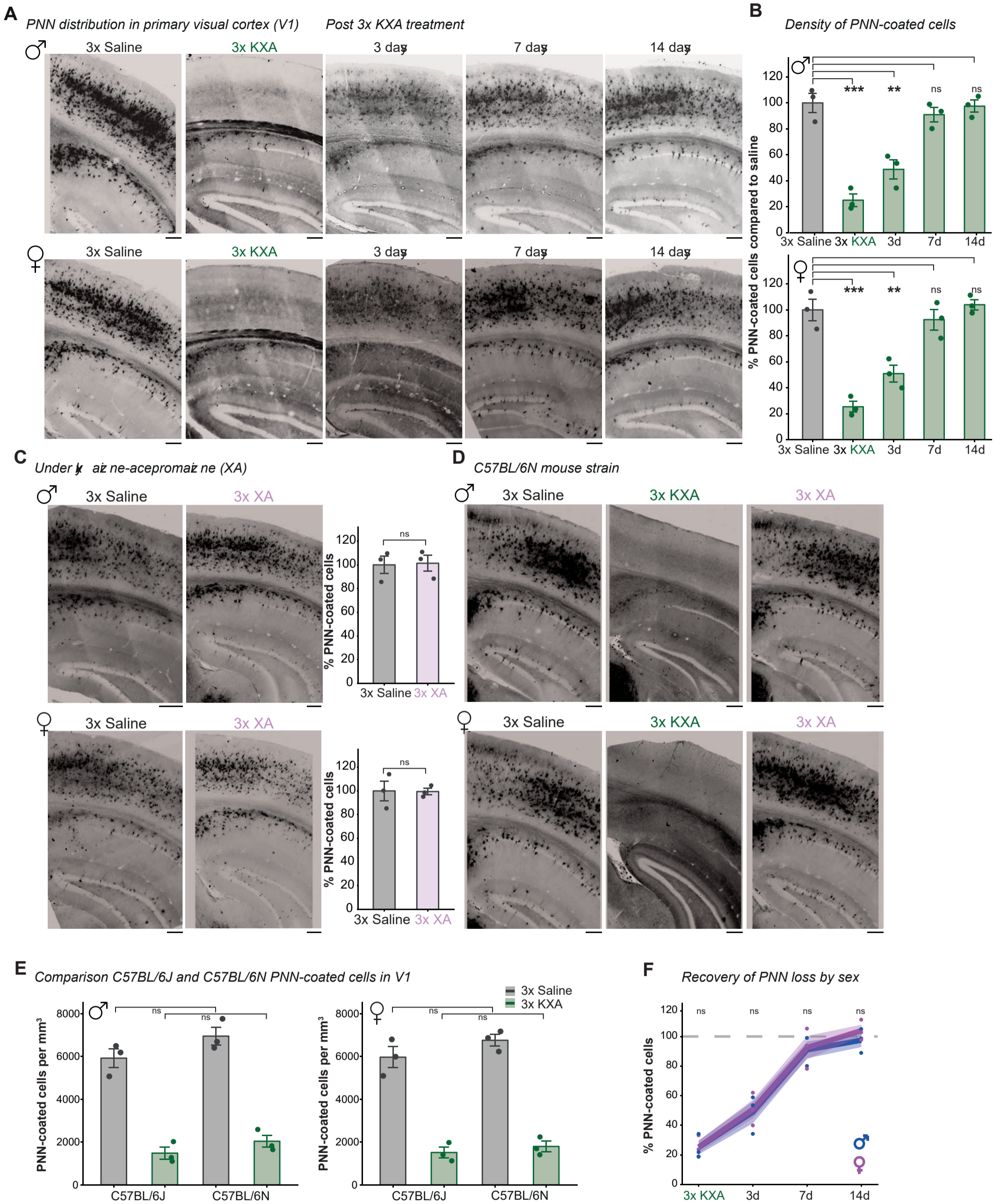
**F** Density of PNN-coated cells



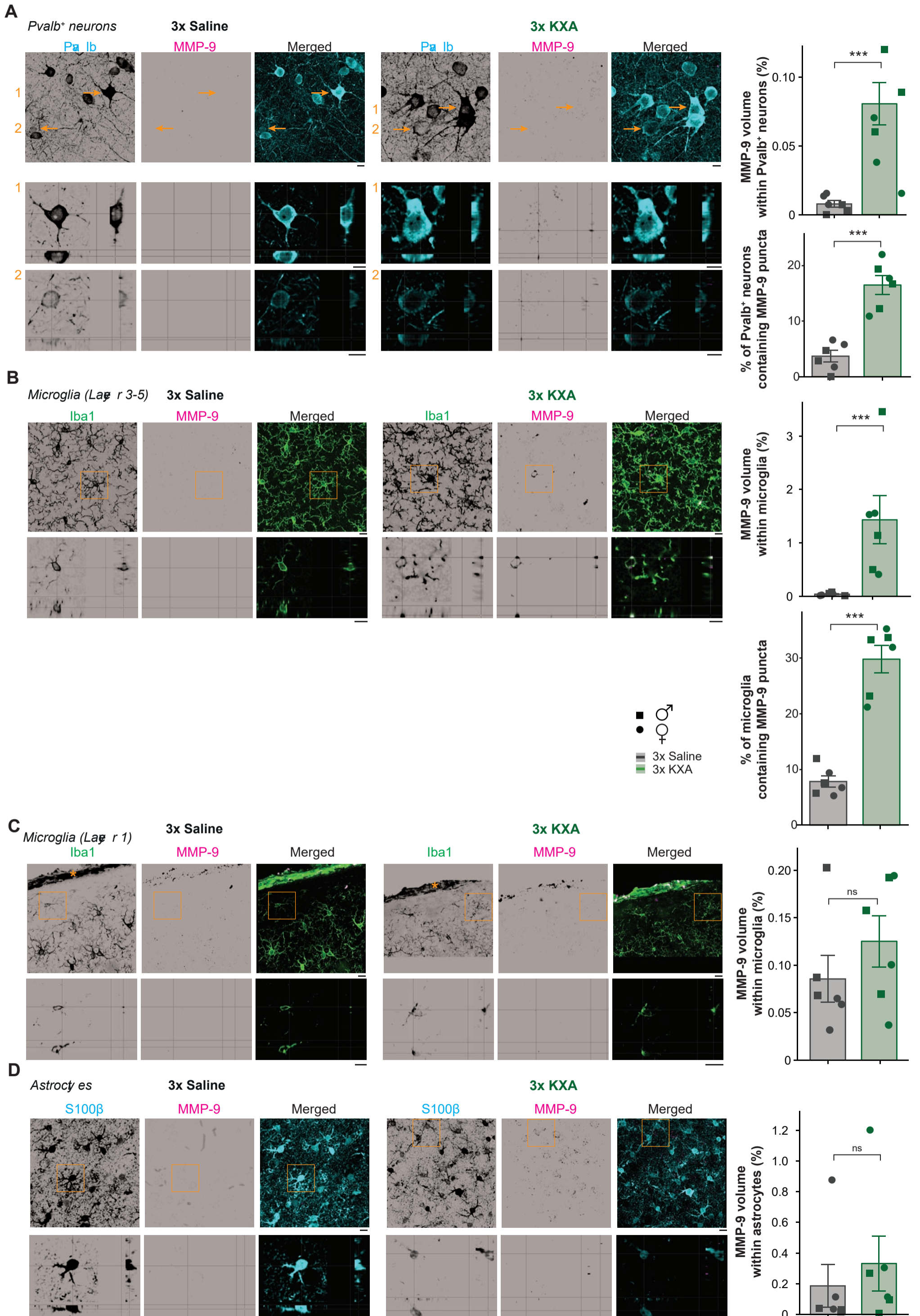
**Figure S2. No PNN loss upon repeated saline injection, and no ketamine-induced apoptosis, Related to Figure 1**



**Figure S3. Ketamine causes transient PNN loss in V1, and is independent from repeated XA treatment alone and mouse strain background. Related to Figure. 1**



**Figure S4. Repeated KXA treatment increased MMP-9 level in Pvalb<sup>+</sup> neurons and microglia located in cortical layers 3-5, Related to Figure 2.**



**Figure S5. CD68 expression increased during ketamine exposure and gradually recovered after last injection, Related to Figure 2.**

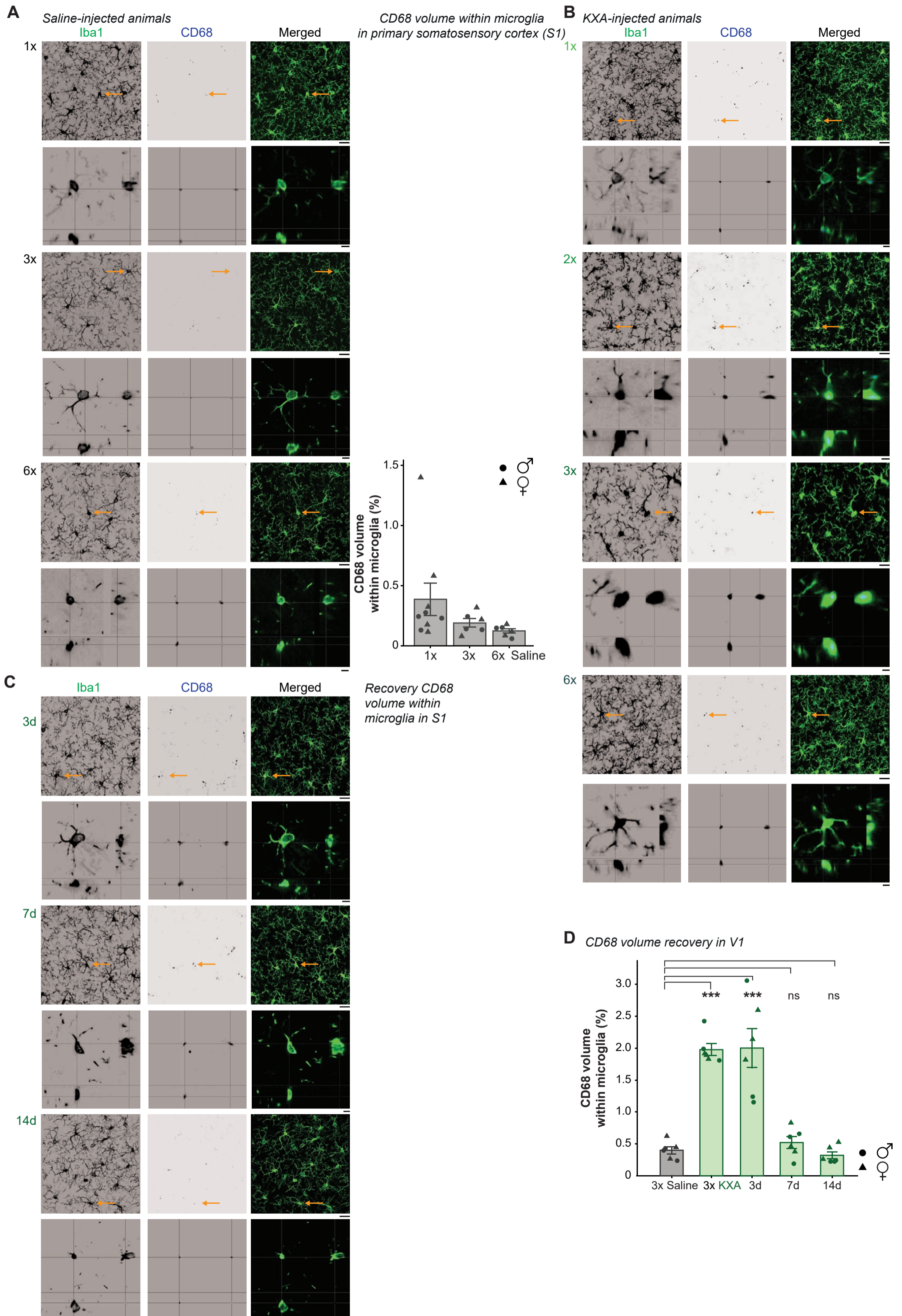
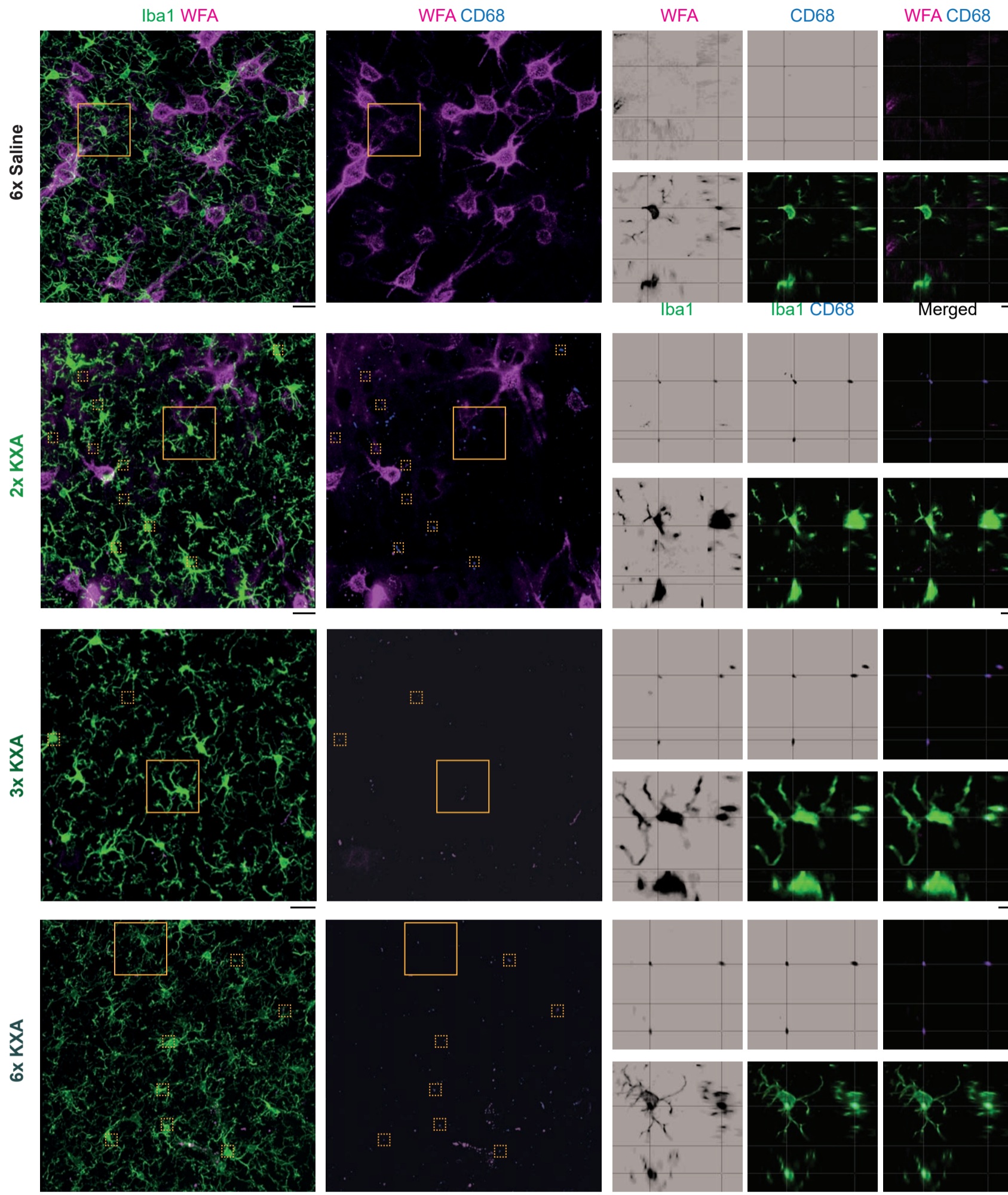


Figure S6. Multiple microglia contain PNN/CD68 fragments after ketamine exposure, Related to Figure 2.

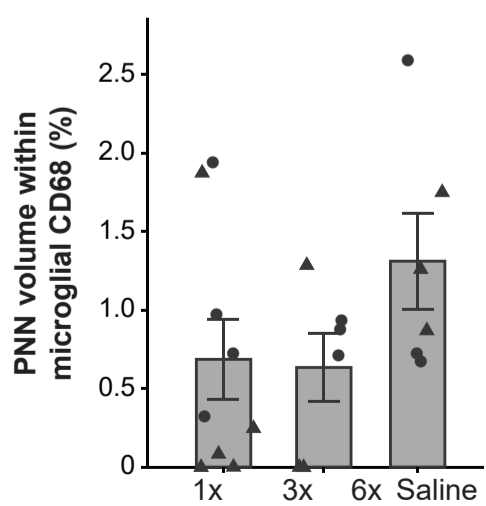
**A**

Perineuronal net fragments inside microglia in primary somatosensory cortex (S1)



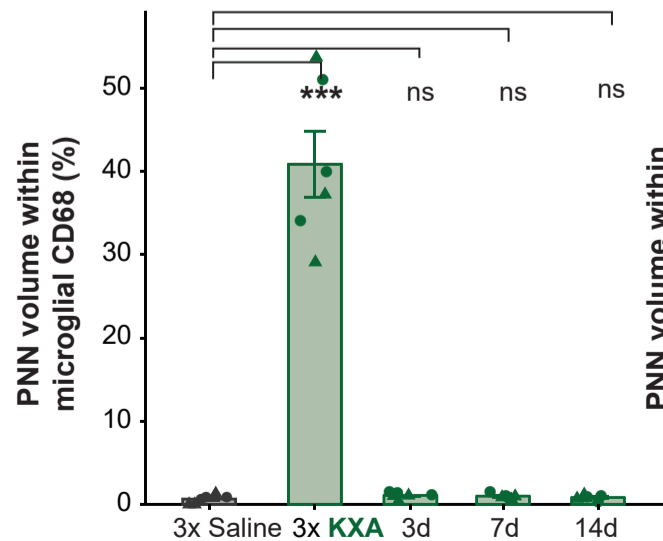
**B**

PNN inside microglial CD68 in S1



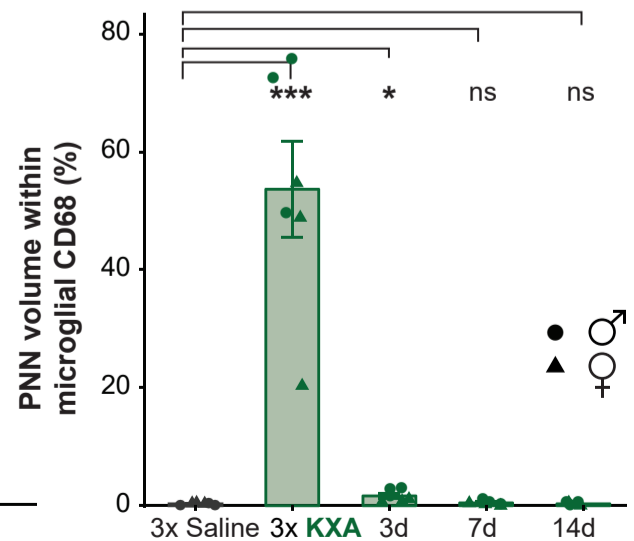
**C**

PNN inside microglial CD68 in S1



**D**

PNN inside microglial CD68 in V1



**Figure S7. Consequences of microglial manipulation, Related to Figures 3 and 4.**

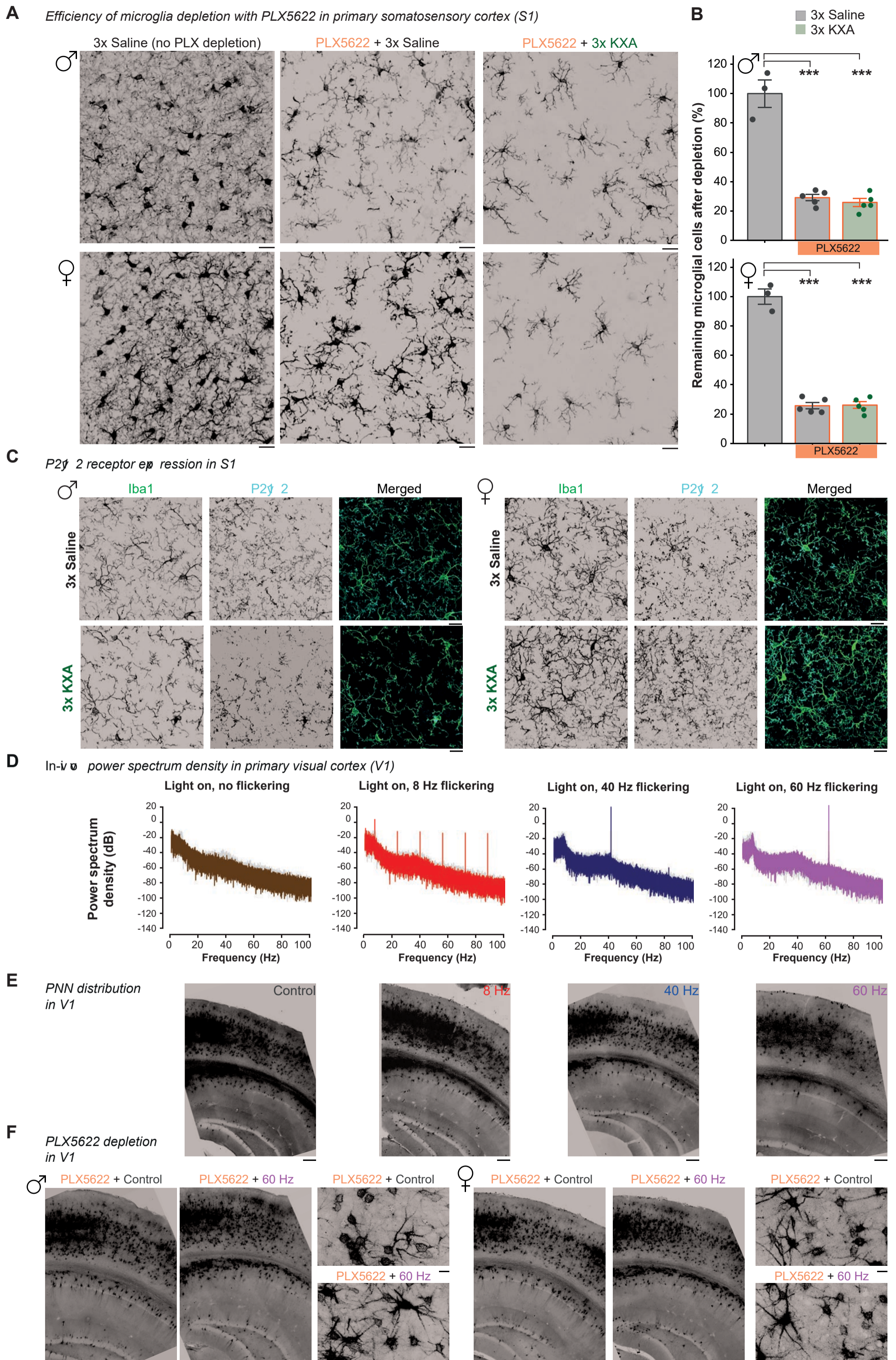


Figure S8. Effects of light flickering on parvalbumin<sup>+</sup> neuron-microglia distance and MMP-9 expression level, Related to Figure 4.

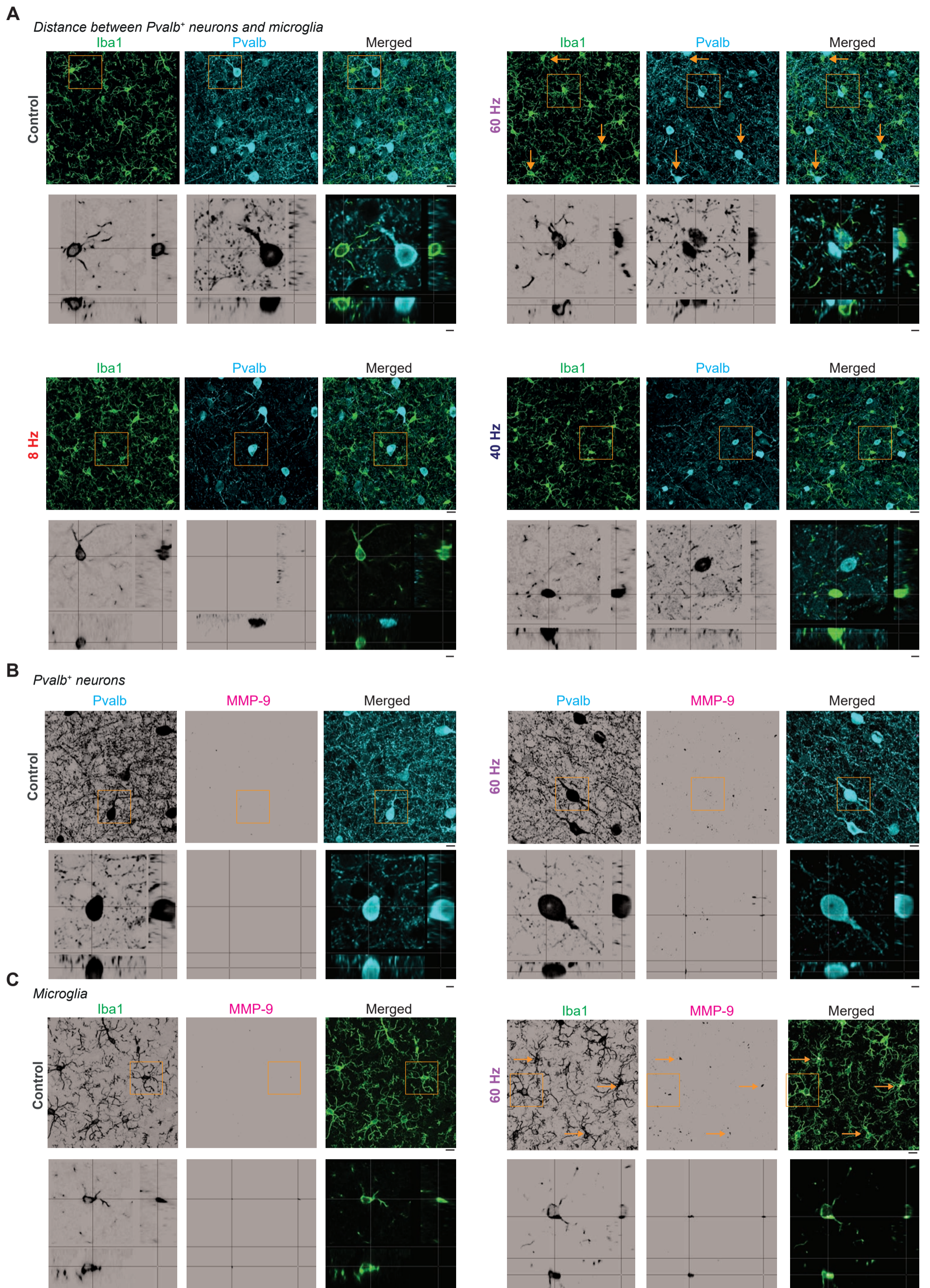




Figure S9. 60 Hz light-flickering induces PNN removal via microglia, Related to Figure 4.

