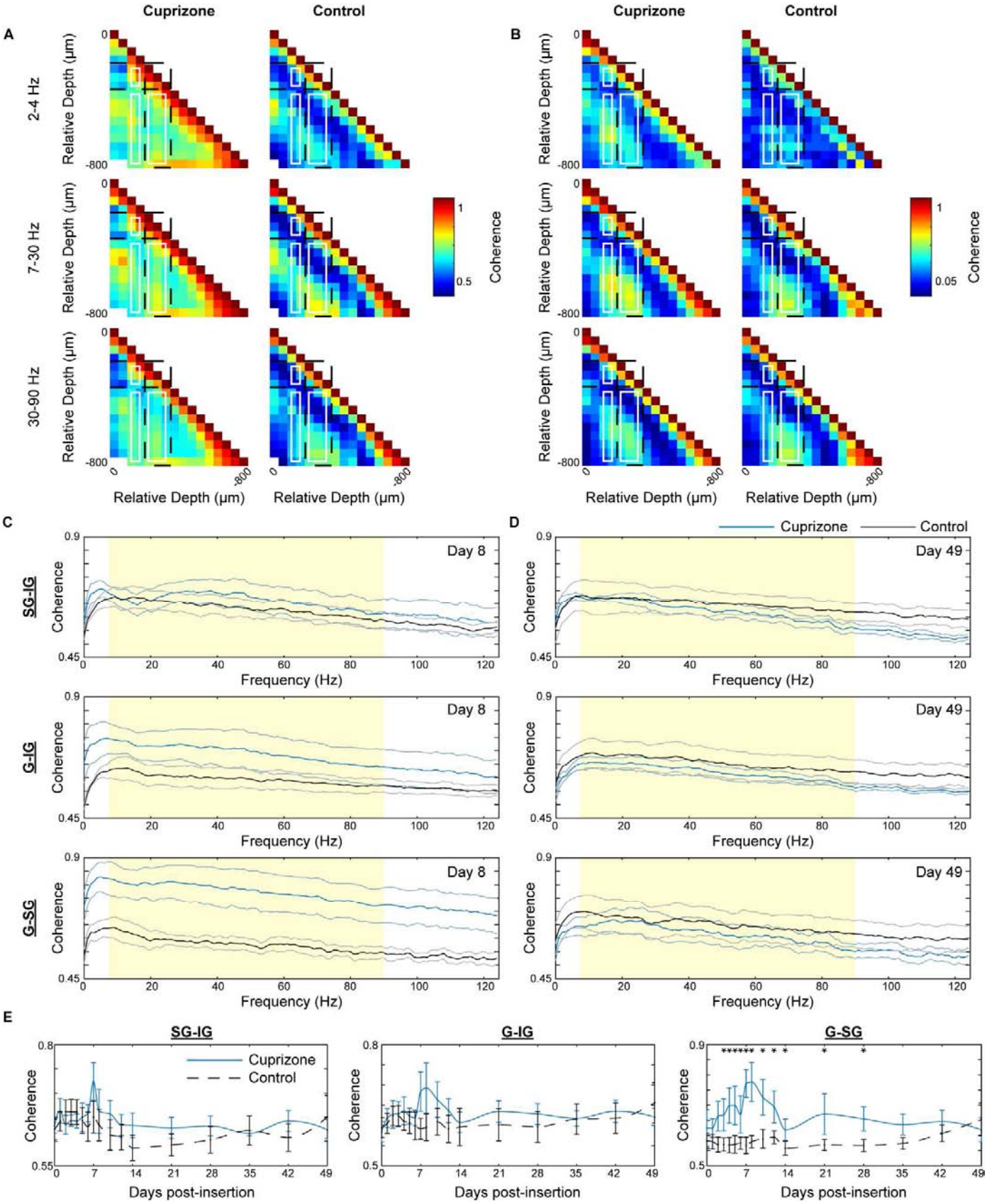
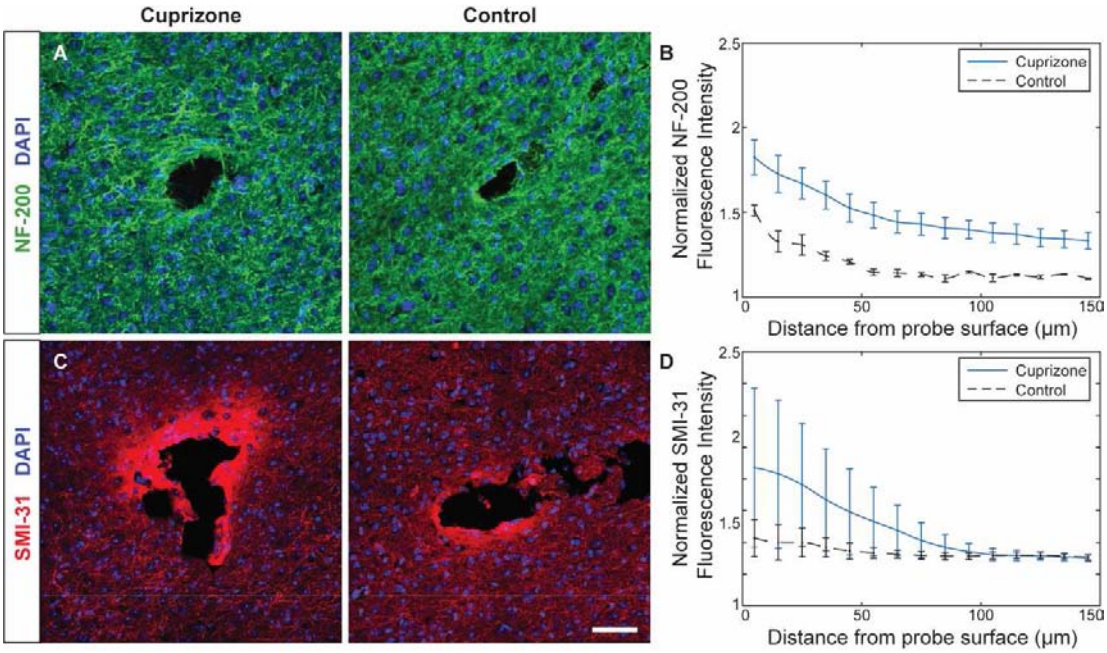
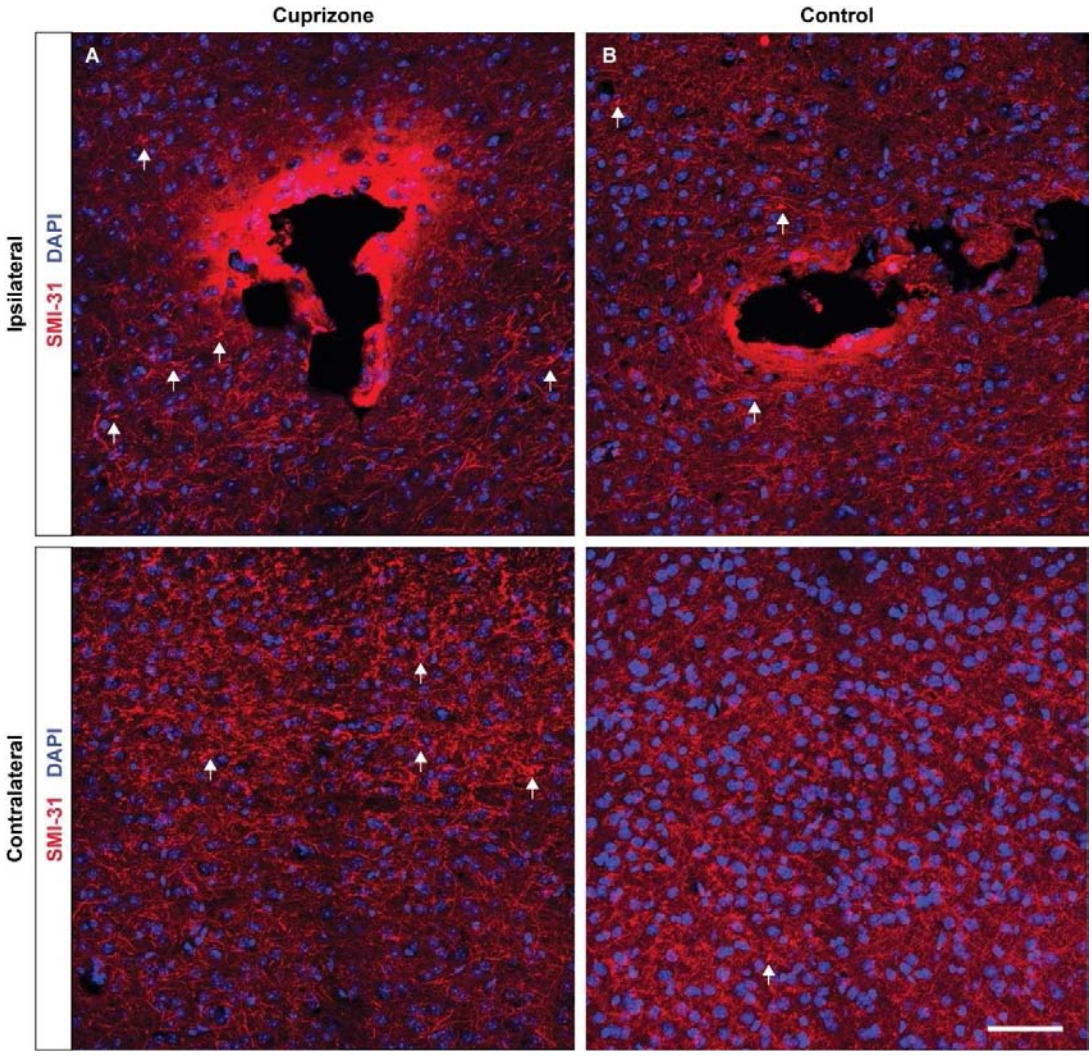


Supplementary figure 1. Oligodendrocyte depletion and demyelination increases resting-state coherence within and between different cortical layers. Resting-state coherence between cuprizone-treated and control animals at day 8 (a) and day 49 (b) post-insertion. Missing coherence values in (a) are an indication of lost information following electrode depth adjustment to layer IV. Resting-state coherence between supragranular-infragranular (SG-IG), granular-infragranular (G-IG),

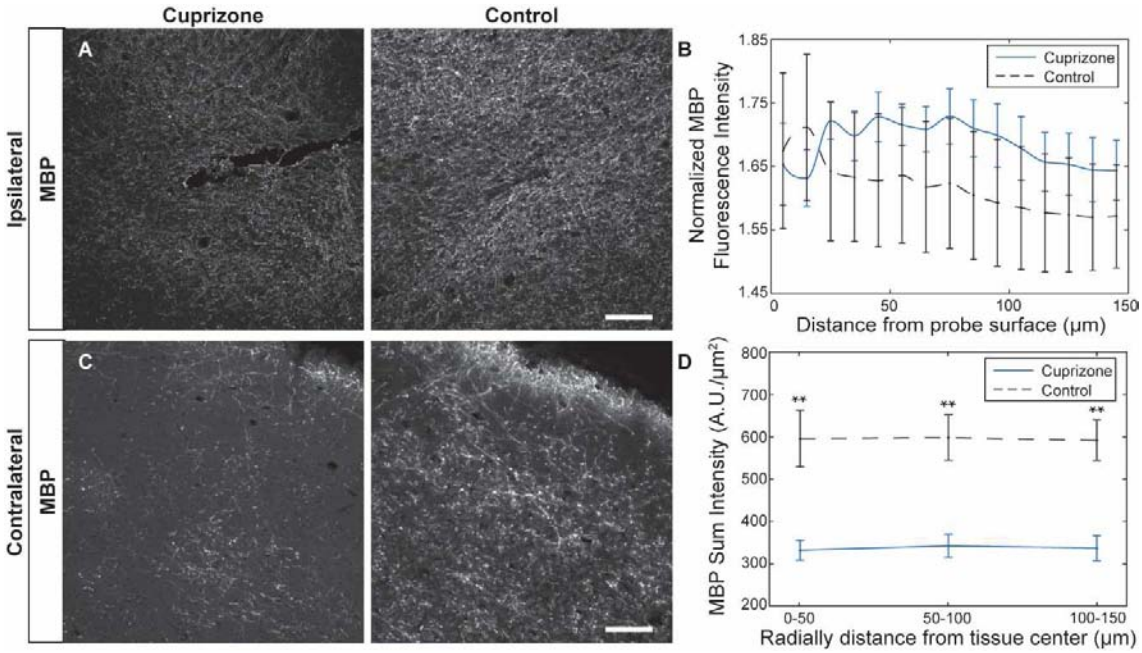
and granular-supragranular (G-SG) regions over frequency between cuprizone-treated and control mice at day 8 (c) and day 49 (d) post-insertion. (e) Mean coherence between 7 and 90 Hz (shaded region of c and d), averaged across animals in each group. ***** indicates non-overlapping 95% confidence intervals at each time point as determined by likelihood ratio test applied to a linear mixed effects model for cuprizone-treated and control mice. Data presented as mean ± SEM.



Supplementary figure 2. Cuprizone administration induces axonal immunoreactivity around chronically implanted microelectrode arrays. (a) Representative stain for NF-200+ axons in cuprizone-treated and control animals around a microelectrode probe hole (*n* = 3). (b) Normalized intensity demonstrated increased NF-200+ intensity in cuprizone-treated mice compared to controls. (c) Representative stain for SMI-31+ phosphorylated axons in cuprizone-treated and control animals around a microelectrode probe hole. (d) Normalized intensity demonstrated increased SMI-31+ intensity in cuprizone-treated mice compared to controls. Scale bar = 50 μm.



Supplementary figure 3. Increased accumulations of phosphorylated neurofilaments following cuprizone administration around chronically implanted microelectrode arrays. Representative images of SMI-31+ phosphorylated axons on ipsilateral and contralateral hemispheres in (a) cuprizone-treated and (b) control mice (*n* = 3). White arrows indicate instances of SMI-31+ axonal accumulation, which is more prevalent around the microelectrode insertion site in cuprizone-treated mice compared to controls. Scale bar = 50 µm.



Supplementary figure 4. Microelectrode implantation increases myelin expression proximal to site of injury despite chronic administration of cuprizone. (a) Representative images of MBP+ myelin around the microelectrode insertion site 7 weeks after insertion in cuprizone-treated and control mice. (b) Normalized MBP fluorescence intensity demonstrates increased MBP staining with increased proximity to microelectrode device. (c) Representative image of MBP+ myelin in contralateral hemisphere of cuprizone-treated and control mice. Scale bar = 100 μm. (d) Sum fluorescence intensity of MBP+ myelin on contralateral hemispheres demonstrate reduced myelin expression in cuprizone-treated mice compared to controls. ** indicates $p < 0.01$.